RAILROAD GAZETTE

FRIDAY, APRIL 6, 1894

CONTENTS.

ILLUSTRATIONS:	PAGE.
Timmis' Automatic Block Signals	240
Some Track Buffers	241
Naylor Cross Compound Pumping Engine	242
The Transfer Steamer Ste. Marie	244
Power-Feed Sandpapering Machine	245
New Tank Valve and Stand Pipe	246
The "Lady" Signalman.	246
Rodgers' Panel Sander	247
Standard Smoke box—Mexican Central Railroad	247
Corrosion of Pipes and Telephone Cables Due to Electrolytic Action.	251
CONTRIBUTIONS:	
Green for All Clear.	239
EDITORIALS:	
The International Railroad Congress	248
A Raid on the Coast Survey	249
Complaining Shippers and Their Treatment in England	249
The Railroad Bond Market for March	250
EDITORIAL NOTES	248, 251
New Publications	251

GENERAL NEWS:	PAGE.
Bridge Building	254
Railroad Law	254
Meetings and Announcements	255
Personal	255
Elections and Appointments	256
Railroad Construction	256
General Railroad News.	257
Traffic	258
MISCELLANEOUS:	
Technical	252
The Scrap Heap	253
An ex-Commissioner on the Interstate Commerce Law	239
The International Railroad Congress	239
What Is an Economical Load for a Locomotive?	241
Steam Distribution for High Speed Locomotives	242
Air Brakes on Freight Trains	244
Handling Defective Air Brake Cars	245
The Management of Terminal Freight Yards	245
The Missouri River	245
Foreign Railroad Notes.	252

Contributions.

Green for All Clear.

New York, New Haven & Hartford Railroad,
SOUTH FRAMINGHAM, Mass., March 31, 1894.

TO THE EDITOR OF THE RAILROAD GAZETTE:

I am heartily in sympathy with the movement to substitute green for white as an "all clear" night signal, and have read with pleasure your editorial of March 23 on this subject.

With us, green is an "all clear" night signal in semaphore practice, but we are using the three-light system, which, besides not conforming to standard practice, is, to my mind, an unnecessary and expensive complication. It is estimated that a change to the single light on the five divisions (formerly constituting the Old Colony Railroad) now using the three lights, would effect a saving of $4,200 yearly in lamps, oil and wicks alone, to say nothing of labor. Such a change has been under consideration for some time, the operating officers on these divisions, with our General Superintendent, being quite generally agreed that with our system of examination for color blindness the night "position" signal is unnecessary; and all are firm believers in uniform practice; but for the reasons so fully set forth in your article, and particularly on account of the danger arising from the accidental or malicious breaking of a colored lens, there is a good deal of hesitation about changing to "white" for "all clear."

What you say in relation to distant signals is of special interest as dealing with the bugbear most commonly set before the advocates of a change from the present standard. Much ingenuity has been shown in attempted solutions, of this, to me, simple problem; but in most attempts which have come to my notice, two essentials, vital to good signal practice, appear to have been overlooked. Signals should, first of all, be distinct; second, they should be simple. For night signaling, there are, in my opinion, three lights, and three only, which meet these requirements, viz., white, red and green. The use of other lights I believe unnecessary, and, to a certain extent, dangerous; an opinion greatly strengthened by some recent experiments, conducted by Prof. Geo. F. Swain, of the Massachusetts Railroad Commission, and myself, and briefly referred to in the last annual report of the Commissioners.

Using red for danger (about which there is no dispute) and green for safety, we have white left for caution, to my thinking the ideal signal for the purpose. With this arrangement of lights, the worst that can happen in the event of a broken lens, or the mistaking of a foreign white light for a signal, is the delay incident to the display of a caution signal—never an accident; with the further advantage that whenever a colored glass is broken, we at once display a caution signal, visible at the greatest possible distance, and one which can, by no possibility, be mistaken for "all clear." As between the two signals, all-clear and caution, there can be no question as to which should be visible at the greater distance.

Notwithstanding the fact that the use of red and green for caution in connection with distant signals has proved satisfactory on the Chicago & Northwestern, the object being accomplished in this case by the use of an ingenious lamp designed by Mr. E. C. Carter, Principal Assistant Engineer of that road, this arrangement possesses one feature common to all combinations of different lights for signal purposes, and which should debar it from adoption as a standard. I refer to the danger that in case of snow the red lens may become covered, leaving the green only visible, a thing which I understand has once happened on the C. & N. W., and of which there would be great danger in this locality of sticky snows.

I sincerely hope that this question will receive the attention it merits and that it will be acted upon at the forthcoming meeting of the American Railway Association.

C. A. MCALPINE, *Superintendent.*

An ex-Commissioner on the Interstate Commerce Law.

The April number of *The Forum* contains an excellent article by Colonel Walker, entitled "Has the Interstate Commerce Law Been Beneficial?" It is a fortunate thing for the country that a man with so much knowledge and judgment should be induced to write so freely in a review of great popular circulation, for while no one article by any one man can make a revolution, such an article by a man speaking with so much authority cannot fail to have a valuable influence on public opinion.

Colonel Walker begins with the proposition that the Interstate Commerce Law has greatly disappointed many different classes of people, many of the complaints arising from misunderstandings of its purpose and scope. For instance, the Kansas farmer who finds that his wheat still goes to the Atlantic ports, the Missouri River jobber who finds that the law does not give him a geographical advantage over the dealer farther west, the commercial traveler who finds that he still has to pay in traveling approximately what other citizens pay, the manufacturer who finds that his freight has to be weighed and classified, the drover who finds that 20 head of cattle will now fill a car, whereas it used to take 30,—all of these, people, and others who find special privileges more difficult to procure than they used to be, are among those who "supply abundant declamation respecting the injury which the law is working to the business interests of the country."

The fundamental principles of the law are but two—first, reasonable and just charges; second, no unjust discriminations—and these principles have been recognized in the common law and in railroad charters and railroad legislation from early times. The first principle has prevailed, whatever may have been the influence of the law, and "sagacious business men are beginning to inquire how long the roads can go on with their business at the present rates."

The enforcement of the second requirement has been less successful, but Colonel Walker asserts that many reforms have taken place under the pressure of the statute which, but for it, would have been indefinitely postponed. In the matter of classification, for instance, there has been a great change. Within 60 days after the passage of the law the six chief classifications of the roads east of Chicago were merged into one. Local classifications of individual roads were speedily abandoned; and now, instead of 40 different general classifications, with numerous others of local application, there are practically only three, the official, the Western and the Southern.

Another of the grievances set forth by the Senate Committee which reported in 1886 was that local rates were unreasonably high compared with through rates, and this complaint led to the short-haul clause of the law under which a general reconstruction of tariffs followed and "three-fourths of the cases where this complaint existed immediately disappeared." But the effect on railroad earnings due to the short-haul rule and to the consolidation of classifications has been "largely responsible for the shrinkage in railway earnings since the passage of the law."

Colonel Walker thinks that discriminations as between individuals for like service and as between localities similarly situated have been much lessened by the action of the law.

But the great difficulty of rate wars, disturbing and distressing to business interests, still exists and secret rate cutting has not entirely disappeared. The law was framed to permit the most stringent competition by theorists who little realized the results of unlimited competition. In fact, in Colonel Walker's view the application of the principle of unrestricted competition in transportation will end in ruin not to the transportation agencies alone, but to everybody else. While co operation between business competitors is admitted to be proper and legitimate for the necessary regulation of excessive competition, in railroad traffic there is no other way to get along. "Traffic must be divided in some way. The present method is as unscientific as that of a group of chickens picking up corn, or a lot of hogs with their feet in the trough." Monopoly will perhaps end both excessive competition and unjust discrimination.

A fundamental difficulty with the law is that while it attempts to regulate the railroads it does not attempt to protect them, and another one is that Congress apparently laid down a few general principles in which the world agrees, made them applicable to traffic between the states and then provided for a commission of an anonymous character to interpret an imperfect law. "Years have passed and with them has gradually disappeared the practical usefulness of the Commission.' The disregard of its recommendations has become, not the exception, but the rule, and for this situation Congress alone is to blame.

Two courses might have been followed. An administrative body might have been formed to collect information and to enforce conformity to the publicity features of the law, leaving it to citizens to begin action for damages; or a body with judicial authority might have been established to which either shippers or carriers might go for relief. Instead of this, Congress invented a body both quasi-judicial and quasi-administrative, but neither judicial nor administrative. In fact the attempt was to make it both prosecutor and judge, two functions obviously incompatible.

"The time has now come when something must be done. A radical overhauling of the law is necessary. It should be torn in pieces and reconstructed." There should be government protection of the railroads, not only against the public, but against themselves and each other. The railroads are in many respects helpless. "Their natural tendency appears to be to run down the hill into the sea." Unless a change is made "the United States Government will be managing the consolidated system of American railways without any expensive purchase and without knowing how it came about, the practical general managers being the Circuit and District judges, operating through experts or lawyers called receivers, and meeting in different judicial districts for frequent conference upon matters of general policy. This happy result has already been quite substantially attained in the Eighth Judicial Circuit, which embraces Little Rock, St. Louis, Omaha, St. Paul and Denver."

Colonel Walker makes a few suggestions as to the form which a new act should take, and in closing says that the Interstate law has been beneficial to business interests, but in its present form has little remaining value, and in some respects it is prejudicial rather than beneficial. He is evidently not hopeful of any useful change so long as Congressmen and Senators appear to regard the subject of "domestic commerce as a kind of butterfly net wherewith to entrap the fluttering voter as he wings his way from party to party." It is from an enlightened public opinion only that he seems to hope for a more rational attempt at the regulation of the railroads.

The International Railroad Congress.

The following are the questions for discussion at the fifth session of the International Railroad Congress, to be held in London, in June, 1895. Further particulars will be found on the editorial pages.

Section I.—Way and Works.

I.—Strengthening of Permanent Way in View of the Increased Speed of Trains. Type of permanent way suited for lines traversed by trains at high speed. Gradual strengthening of existing roads, so as to permit of an increase in the speed of trains. (*a*) Section of rail. Calculation of the strains imposed by the rolling load. Results of experiments. (*b*) Mode of manufacture and nature of rail-metal. Comparison of soft with hard steel. Steel produced (1) by the acid process in the Bessemer converter; (2) by the basic process in the converter; (3) by either process in the Martin furnace. (*c*) Rail connections. Fatigue of fish plates. Construction of joint best calculated to secure uniform strength of the road throughout. Rails laid in chairs and Vignoles rails. (*d*) Sleepers, their quality, dimensions and distance apart. (*e*) Ballast, the various descriptions and methods of laying.

II.—Places in Permanent Way Requiring Special Attention. Means to avoid the necessity of expresses slackening speed, and to prevent shocks in passing special points, such as sharp curves, long and steep gradients, facing points, rail crossings, road crossings, swing bridges, etc.

III.—Junctions. Best method of constructing junctions upon express lines so as absolutely avoid slackening speed. Best arrangements of points and crossings. The most efficacious means of maintaining the speed of trains while abandoning super-elevation at junction curves.

IV.—Construction and Tests of Metallic Bridges. (*a*) What are the quantities of metal used and required to be used in railway bridges, according to the regulations in force in different countries? (*b*) What are the nature and value of the methods adopted by the different railway administrations for the original and the subsequent periodical testing of metal bridges? (*c*) What is the real value of these tests, and can they be regarded as practical means of settling the actual state of repair and the margin of safety of the above-mentioned structures.

Section II.—Locomotives and Rolling Stock.

V.—Boilers, Fire-Boxes and Tubes. (*a*) Steel boilers and fire-boxes. Strain to which they are subjected in use, and conditions on which the plates are accepted. (*b*) Iron tubes. Means of preventing leakage at the tube plates. (*c*) Injurious effect of the feed water on the boilers and tubes. Systems of purifying. (*d*) Synopsis of experiments as to the production of steam, viz.: Results obtained with tubes according to their diameter, length system, arrangement in the boiler, and the metal of which they are made. Experiments as to the influence of the capacity of the smoke-box, and the different forms of chimneys and spark arresters. Experiments with the various forms of blast pipe. Experiments as to the effects of speed on the production of steam.

VI.—Express Locomotives. Type of engine most suitable for high speeds. The use of high pressure and application of the compound principle. Improvements in distribution and balanced slide valves. Engine building regarded from the point of view of diminishing the strains on the permanent way. The effect from this latter point of view of the compound principle.

VII.—Rolling Stock for Express Trains (2d and 3d Sections combined). Type of rolling stock for express trains, and long journeys. Vestibule trains. Improvements in internal arrangements. Various modes of heating and lighting.

VIII.—Electric Traction. The general question of electric traction.

Section III.—Traffic.

IX.—Acceleration of Transport of Merchandise (2d and 3d Sections combined). Influence of speed upon the expenses of

haulage, and the utilization of rolling stock, on the one hand; and on the other hand, upon the number of vehicles and the amount of accommodation and plant required.

X.—Station Working. (*a*) Methods of accelerating the shunting of trucks and handling of merchandise. Arrangement of sorting sidings. (*b*) Employment of mechanical and electrical appliances in shunting and marshalling.

XI.—Signals. Recent improvements in block and interlocking apparatus, chiefly from the point of view of economy in initial outlay. Signals in tunnels. Methods of preventing collisions at points of danger on express lines, in case of overrunning stop signals. Replacement of color signals by geometric form signals, in order to avoid the dangers arising from color-blindness or defective vision.

XII.—Cartage and Delivery. Organization for the collection and delivery of goods and parcels consigned by railway.

Section IV.—General.

XIII.—Organization. Organization of the central administration, and outdoor staff on the various systems of different countries.

XIV.—Settlement of Disputes. Rules for settlement of differences arising between railroads with respect to goods traffic.

XV.—The 24-hours Day (3d and 4th Sections combined). Introduction in the time-tables of continuous reckoning from 1 to 24 hours, and of the division of the hour into 100 parts. Present state of the question. Partial adoption in different countries. Advantages to the public, and to the railway service. Would the alteration of existing clocks be necessary, and if so, how could it best be accomplished?

XVI.—Decimal System (1st and 4th Sections combined). General adoption of the decimal system in calculations relating to the construction and working of railroads. Method of facilitating the introduction of the metric system of weights and measures in those countries where it is not already in use.

Section V.—Light Railroads.

XVII.—Contributive Traffic (4th and 5th Sections combined). Method adopted by the great railroads to encourage the building or working of light, feeder lines.

XVIII.—The Working of Light Railroads by Leasing Companies. In what country has the system of leasing light railroads been adopted? On what terms are such leases granted and with what practical results?

XIX.—Light Railway Shops. Should the principal shops be in the middle or at one end of the line?

XX.—Brakes for Light Railroads (2d and 5th Sections combined). Account of the different kind of brakes in use on light railroads. Their respective advantages both from the technical and from the public safety point of view.

The Timmis Automatic Block Signals.

The strongly decided stand, taken against the use of automatic railroad signals, by the English Board of Trade has led to the manifestation of very great interest on the part of railroad men in the working of such appliances upon the Liverpool Overhead Railroad, practically the only line in England where their use has been sanctioned.

This line was opened a year ago and the signals have proved fully equal to the claims made for them, 95 per cent. of the trains having kept schedule time on a three-minute headway, whilst the proportion of failures to the number of signal operations involved has not exceeded 1 in 213,000.

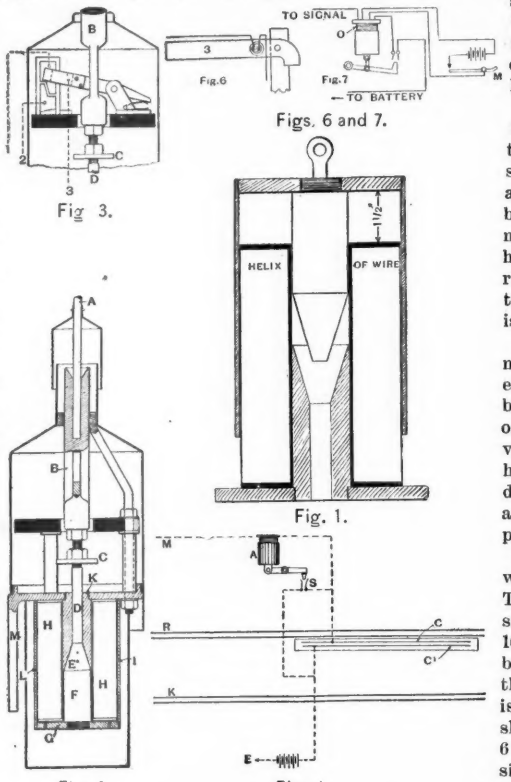
A brief description of the arrangement of the signals was published in the *Railroad Gazette* of March 3, 1893, page 166, and we now print some drawings showing the construction of the electromagnet which forms an essential part of Mr. Timmis' method for transforming the energy of electric currents into a mechanical pull by which a signal arm may be raised or lowered.

Fig. 1 shows a vertical section of Timmis' "long pull" electromagnet as used at Liverpool. These appliances each consist essentially of an insulated copper wire helix or coil, wound upon a brass spool with a core hollowed out in cone shape and drilled through with a round hole. The armature is formed of three parts—an outer cylindrical shell fitting loosly over the magnet coil, a disc shaped base screwed into the shell, and lastly the inner core—a solid cylinder of soft iron terminating in a cone-shaped end to fit the cavity in the magnet core. A metal eye fastened to the base serves for attachment to the rod or wire which lowers the signal, gravity in the shape of a heavy counterweight being relied upon to restore the signal arm to its normal position.

The magnet has a maximum travel of 1¼ in., and a pull of 70 lbs., the current required being 5 ampères on a 50-volt circuit, as usually employed. A larger pattern has a pull of 244 lbs. at a distance of 4 in.; the current required being 28 ampères under similar conditions.

The cuts, figs. 2 and 3, show details of a later type of magnet now used by Mr. Timmis, in which the armature acts upward *against* and not *with* its own weight. The chief reason for thus inverting the positions of armature and magnet is that the weight of the former becomes thereby available for overcoming any permanent magnetism in the magnet coil or core. In this later type, *A* is a rod leading up to the signal arm, which it lowers when pushed up by the armature; *B* is a casting into which the rod *A* loosely slides, a round hole being drilled for the purpose to a suitable depth: *C* is a screwed adjustable washer forming a stop to regulate the drop of armature; *K* is the magnet core screwed into a base and angle plate casting *M*; *H* represents the hexil or wire coil; *L* is the outer shell of armature; *G* its base; *F* the solid cylindrical core with conical extension *E*; and *D* is a rod secured to the latter and passing upward to the cast frame *B*, through which, as stated, the thrust is communicated to the signal arm.

Fig. 3 represents a side view of the same arrangement, showing, however, a spring lever arm lifted by the upstroke so as to throw in and out one or other of two electrical contacts; that is, when no current passes through the electromagnet the circuits (shown by dotted lines) 2 and 3 are connected, but as the armature is attracted it throws the electric switch arm on to the upper contact plate, so that circuits 1 and 3 are connected. The chief object of this is to change over from the main circuit to the local. Obviously less current is required to keep an armature in position when once attracted than to bring it into that position, hence a small local battery is provided to give what is called the "holding" current, while the main current is employed to first attract the armature into its proper position for working the signal. A considerable saving of electric energy is thus obtained.



Apparatus for Working Timmis' Block Signals.

Fig. 5 represents a diagram of one track of a double line. Two stations are shown, *s* and s^1, with signals to correspond, viz.: No. 1, starter at *s*; No. 2, home for s^1; No. 3, starter for s^1. Suppose, now, that a train is on line between the stations, it is protected in the rear by signal arm No. 1, the starter at *s*, which the train has automatically thrown to danger in passing. If the line in front is clear, the signal No. 2 should be down, and the train therefore runs into the station s^1, throwing the signal 2 to danger as it passes by actuating a treadle v^2. Leaving s^1 if or when signal 3 is lowered, it passes that signal, throwing it also to danger by means of treadle v^3, and then travels on for some distance with three signals now at danger behind it. On arriving at *M*, however, another treadle is operated, which clears signals 1 and 2 *if*, and only *if*, the signal 3 remains at danger. Fig. 6 shows more in detail how this is accomplished, the circuit being completed through a mercury contact in the semaphore arm, so arranged that the main magnetizing current, which actuates the large magnets and pulls down the signals, can only pass when signal arm 3 is in a horizontal position.

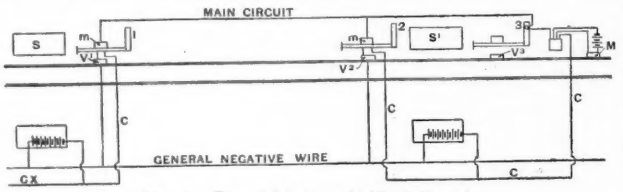


Fig. 5.—Timmis' Automatic Block Signals.

The details of the arrangements employed at *M* are shown more clearly in fig. 7, where *M* represents the contact treadle which completes a local circuit through the relay *O* with a double winding. The latter attracts an armature which closes a switch and sends the main current through to the signals. This arrangement of contact treadle, consisting of a lever projecting from a box on the permanent way—which comes into contact with a device on the last car of the train—has worked quite satisfactorily on the Liverpool road; but in order to give sufficient contact at high speeds Mr. Timmis has devised an arrangement—shown in fig. 4—where a simple sliding contact throws in a relay. In the cut *R*, *R*, represent the rails; *C*, C_1, two insulated strips of metal conductor, which are bridged by the brush or other suitable contact piece on the last car of the train; *S* is the switch closed by the armature of relay *A* when current is passed through the latter by the momentary connection between *C* and C_1. *M* leads to the magnet actuating the signal.

Some Track Buffers.

BY JAMES F. HOBART.

Perhaps the most common form of track buffer is a stick of timber thrown across the track and bolted to the rails. Such a buffer looks businesslike, and works first rate as long as no car is kicked against it. But one day it is used to stop a car with, and a new buffer has to be put in immediately thereafter.

Another common form of buffer, which answers well for ornamental purposes and for a little light work, is the one shown in fig. 1. The ends of the rails are simply turned up until they reach a little more than above the center of wheel. It looks as if this ought to be a good buffer as far as it goes, but, like the Irishman's horse, it is open to three objections: First, a heavy kick will cause the buffer to damage the brake rigging of a car; second, the buffer is not good for anything; third, but like the horse case, the second reason is sufficient.

Fig. 2 shows another buffer which possesses all, and more advantages than are accredited to fig. 1. This buffer is made of two pieces of malleable iron or steel both cast from the same pattern. This buffer has many of the faults of fig. 1, but it can be easily applied, and is very good for temporary work. Both these buffers, however, will let a car jump over them, they both will damage the brake rigging, and they will pull endwise a 200 ft. piece of track. Sometimes fig. 1 varies the proceedings by breaking off in the curve.

Fig. 3 shows the "old reliable" buffer, thousands of which have been pounded to pieces all over the country. This buffer post will, if correctly designed and made, stand a good deal of trouble. The sill should be at least 16 × 16 in., and, if possible, the post and brace ought to be of the same size. The post should be mortised into the sill, also boxed in 1 in. as shown at (*a*). The brace is gained into both sill and post so as to show a 4-in. shoulder at (*c*) and at (*d*). Three clamps (*b*, *b*, *b*) of iron 6 in. wide by 1 in. thick should be put on as shown, besides two 1⅛-in. bolts being put through each clamp, the ends of which should be turned at right angles, and cut into the timber about 2 in. deep as shown at (*e*). Put together in this manner, the post buffer will stand a good deal of trouble. Frequently two of these post buffers are put in on a single track, and connected with a horizontal timber, the buffing being done on the timber half way between the two posts.

Another and quite an elegant form of buffer is shown by fig. 4. Here the ends of the rails are turned up and braced by two short pieces of rail. The vertical parts of the rails are bolted together by 8½-in. bolts, the flanges of the rails being drilled to receive them. A base timber is necessary to hold the short pieces of rail in place, and if the work is heavy it is well to strengthen by putting in a sub-sill as shown. Again, if necessary, the base can be greatly strengthened by cutting in heavy timber braces diagonally between the sill and sub-sill.

The rails are strengthened by long web plates shown at the lift side of block (*b*). This block is a plain piece of timber fastened to the sill by four drivebolts, each ⅞ in. in diameter. By "drivebolts" it is understood that some ordinary bolts had thin ends tapered down (no nuts used), holes bored a little small, and the bolts driven in like pins. These blocks form a bearing for the truck when a car strikes the buffer, and they take a good deal of the wear and tear, as proved by the frequency with which they wear out or go to pieces. The life of one of these blocks is a good deal longer if it be protected by the 6-in. plate of iron, fitted to the notch, as shown.

The buffer proper is made of 16 × 10-in. oak timber, and is fastened to the track iron as shown in figs. 4 and 5, also in fig. 6. The latter engraving is a plan of the buffer, and shows three stiff car springs with a 3 × 10-in. oak plank outside of them. This combination makes a very elastic cushion for cars to kick up against. The manner of bolting is too plainly shown to need any description.

On top of the timber a wrought iron frame is mounted, as shown at (*a*) in figs. 4 and 5. This frame is made to hold a board upon which is displayed the destination, time of departure, etc., of the train leaving from that particular track. On top of this frame (fig. 5) is placed a disc bearing the number of the track. This is, of course, for station use only, the frame being entirely separate from the buffer, and left off if desired.

Another adjustable form of buffer, or, more properly speaking, a "stop," is illustrated by fig. 7. This may be classed with the one shown in fig. 2, but the latter is adjustable only with a monkey wrench, while the former can be clamped on the rail at any desired point by the simple movement of a lever. This, like fig. 2, is a mere wheel stop, and is worthless for heavy business. Still, it is excellent for shop purposes, and is thus used in the Brooklyn Elevated Railroad shops. To move this stop, the pin shown in the engraving as attached to the chain is removed, placed in the hole to the left, and the lever thrown over, or allowed to go over, against the

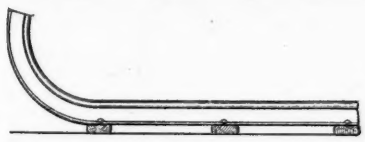


Fig. 1.

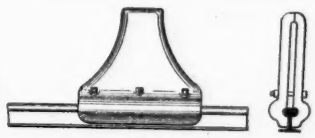


Fig. 2.

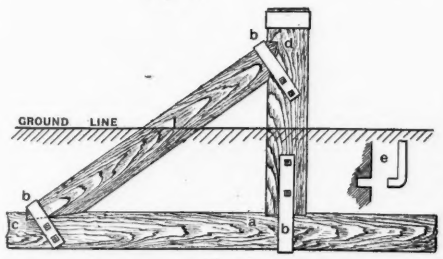


Fig. 3.

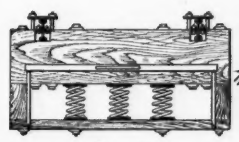


Fig. 6.

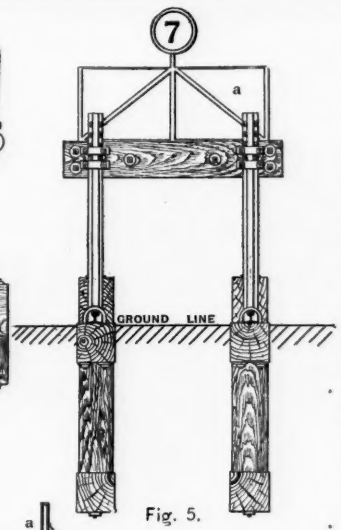


Fig. 5.

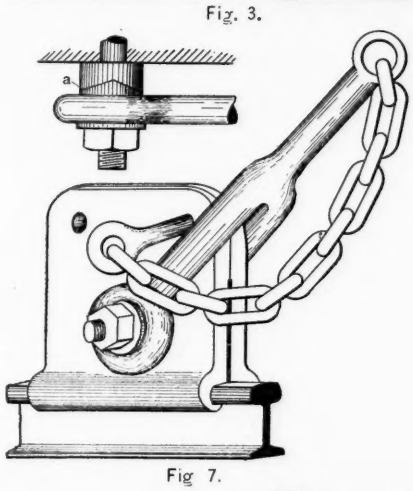


Fig. 7.

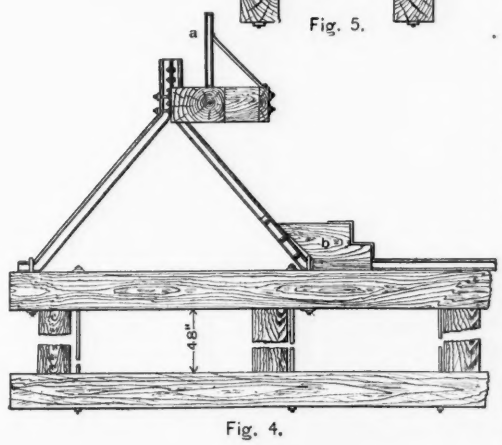


Fig. 4.

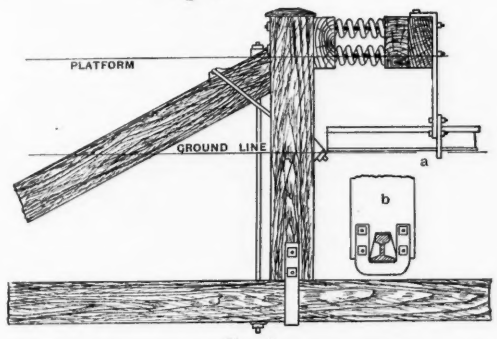


Fig. 8.

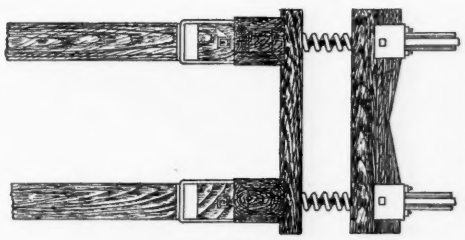


Fig. 9.

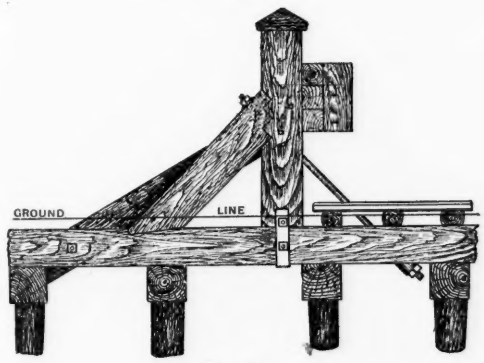


Fig. 10.

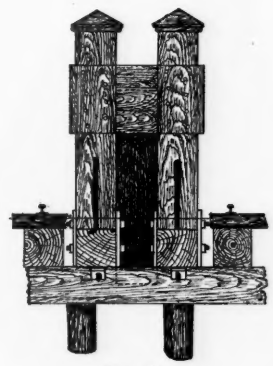


Fig. 11.

SOME TRACK BUFFERS.

pin. When in that position the locking mechanism occupies the position shown at (*a*) in the detail drawing. This loosens the bolt and plates, and allows the stop or buffer to be moved. With the lever in the position shown by the large drawing, the parts shown at (*a*) are thrown out of gear, and all lost motion is taken up by the collars, a similar pair of which are placed on the opposite side of the stop.

A very business like and first-class form of buffer for passenger station use is illustrated by figs. 8 and 9, showing side elevation and plan views respectively of the Pennsylvania Railroad track buffer on stop. The timber framing is of 12 × 16 on 14 × 14 stock, put together in much the same manner as that described for fig. 3, except that only one iron strap is used, that one being at bottom of post, the top strap being replaced by a yoke of wrought iron, which bears upon the brace through a cast iron yoke. A rod is also run vertically through bottom sill and top end of brace, making a very stiff form of construction.

But the chief points of excellence in this buffer lie in the rigging shown at the right of the engraving (fig. 8), the spring rigging being supported by and clamped to the track iron at *a*. The "dead-woods," shown on either side of the spiral springs, take the shock of the cars, and the wrought iron yoke makes it impossible for the spring rigging to be disarranged vertically. This is shown in detail at *b*. Fig. 9 gives the plan arrangement of this very excellent form of buffer-stop construction.

Engraving No. 10 presents a form of freight track buffer which is a model of strength and solidity. The particular form of buffer shown in this and the next illustration (fig. 11) has been adapted for dock and wharf use, or in all situations where the tracks are built on piling. There are two posts and three braces used in this form of construction, and two 2-in. iron rods hold the thing down to business when cars are kicked against it.

This form of buffer is also well adapted for ordinary use, and may then be anchored in the usual manner to heavy sills buried several feet deep in the ground. The extreme strength and solidity of this concern are pretty well shown by the end elevation, fig. 11, and, as appearances indicate, it is built for strong, heavy work, and stands it well.

West Superior Coal Dock.

The contract for the new dock of the Lehigh Valley Coal Co. at West Superior, Wis., has been let to the Dodge Coal Storage Co., of Chicago. It will be of iron and steel and will have a capacity of 175,000 tons.

What Is an Economical Load for a Locomotive?

At the meeting of the New York Railroad Club on March 15, the first paper was by Mr. George W. West, of the New York, Ontario & Western, on the above subject. He said in substance: The conditions on most American roads are such that locomotives must have great starting power, and over-cylindered engines are therefore very common. In consequence of this, the first deficiency recognized, when a locomotive is overloaded, is the lack of steam. With large cylinders, the steam has to be used at short cut-offs, after the train is started, and the main question therefore is, Where shall we work the reverse lever? The superintendent expects enginemen to work more nearly at full stroke and complains because the engines do not haul as large loads as they would if thus worked, while the master mechanic knows that the engine is in good order and that the only trouble is in the size of the load, which requires more steam than the boiler and firebox can make. Loads should be gaged according to their actual weight instead of by the number of cars. Cars now vary greatly in capacity. Five years ago Mr. West's road owned 2,200 cars of not over 20 tons capacity each, and half of them carried less than 15 tons. Now the company has 5,600 cars and more than half of them are of 30 tons capacity. The transportation department is constantly endeavoring to haul as many heavy cars as it formerly hauled of the lighter ones. In summing up, Mr. West said: The easiest and best way to decide what is an economical load, is to have the heads of departments confer frequently, study the interests of the company which employ them more, and not so much their own selfish or department ends.

The discussion was participated in by Mr. Bradley Mr. Mitchell, Mr. Wattson, Mr. Fowler, Mr. Mendenhall, Mr. Joughins and Mr. Errickson. Mr. Bradley said that on his road, the West Shore, the engines are not rated according to the number of cars, but by the weight of the load. Mr. Wattson stated that westbound freight trains on the West Shore are loaded light enough to run at least 20 miles an hour. An eastbound train generally receives 45 cars of hay where it would take only 40 cars of grain. The cars are chalked with the nature of the contents. Mr. Mitchell regarded one-fifth the weight on the drivers as the proper estimate of the tractive power of an engine on a damp or greasy rail, and one-third on a dry, sanded rail. Mr. Fowler told of a case where a man took a contract for keeping the coal cars on a certain road furnished with oil, brass and waste. By furnishing the best materials he enabled the road to increase the load over a certain grade from 14 cars to 18 cars a train, but the company was not satisfied to see him making a big profit and terminated the contract. Then the load dropped back to 14 cars.

Some marked examples of overloaded cars were mentioned. Mr. West found trains of 24 cars to varyas much as 50 tons. Mr. Mitchell found 16 empty stock cars marked 30,000 lbs. which weighed over 38,000 lbs. each. Mr. Errickson found a lot of coal billed at 20 tons to the car which weighed 40 tons, the extra weight being rain water, frozen in. In a trainload of ice on the Central of New Jersey every car was found to contain 40 tons, though they were billed at 20.

Mr. Wattson referred to the comparative cost of running freight trains at high speed as compared with ordinary speeds. To increase the speed from 20 miles an hour to 30, he has to decrease the load 15 per cent. He said:

I have no figures on the subject, but from casual obser vation I believe that, notwithstanding the fact that the engine consumes less time in making the trip at high speed, considerable more fuel is used, and as a final result of high speed a light load is moved at increased cost; but the important question is, How much more? Freight crews being paid by the mile, nothing is saved in wages by high speed. However, the capacity of main track is correspondingly increased with high speed of freight trains, as they have less occasion to turn out of the way of first-class trains, the delays incident to getting freights out of the way being the chief trouble in moving traffic over a busy track. And I believe, further, that with fairly good track, protected by block signals, and a working proportion of the cars in each train equipped with the air-brakes in service, with careful inspection, that taken as a whole, on a crowded track, the service with freight trains making 30 miles per hour will be safer than at 20 miles per hour, and that the capacity of the track will be correspondingly increased. This is on account of the less frequent exposure to danger in stopping to get out of the way of higher speed trains and in getting back to the main track. The lighter the train the easier it can be handled and the less danger of breaking in two or stalling. Also, the crews do not get tired out, but are on the alert over the entire run.

Mr. Joughins thought that the controlling factor was the speed. It is a very difficult matter to say what a locomotive ought to haul from day to day. The season of the year, the condition of the rail and other variables make it impossible to determine with accuracy what a locomotive ought to haul, and it is impracticable to weigh each car before putting it into the train.

Mr. Mitchell told of some engines on the Erie which slipped a good deal, wearing out the tires too fast, but which were all right after the limit of steam pressure was reduced by the master mechanic. Mr Fowler referred to some moguls with 50-in. drivers which gave much trouble by slipping, but which were all right when 56-in. drivers were substituted for the small ones.

Mr. Errickson referred to the difference in enginemen.

One man will go out and use a box of sand in five miles. The next man will run his engine 200 miles with a box of sand and probably make better time. Of course a certain amount of speed is economical. When you go over that it is expensive, and when you go under it it is expensive. What would solve the question quicker than anything else would be to put men in the transportation department with brains equal to the emergency and with the chance to use them.

The Naylor Cross-Compound Pumping Engine.

An important feature of engineering work of the present day is the use of water under great pressure. It is in growing use for working machinery in shops and warehouses. In England several cities have public plants where consumers pay for the power used.

In consequence of this increased use of water under high pressure the manufacture of machinery for giving great pressure has become important, and we illustrate a new design of a cross-compound, surface-condensing pumping engine designed and built by Mr. E. W. Naylor, of New York City, for the United States Projectile Company. This is a two-cylinder engine, connecting with a flywheel and pump cylinders. The steam cylinders are 22 in. and 42 in. diameter and 36 in. stroke, and the pump cylinders, four in number, are

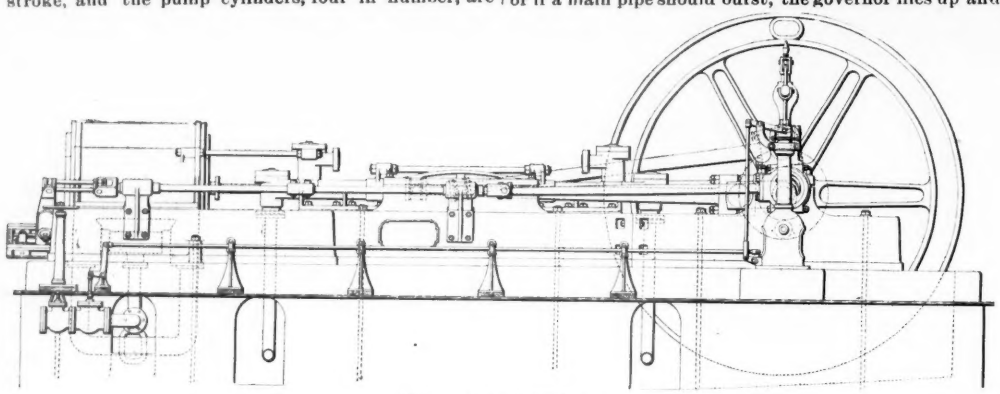


Fig. 1—Side Elevation.

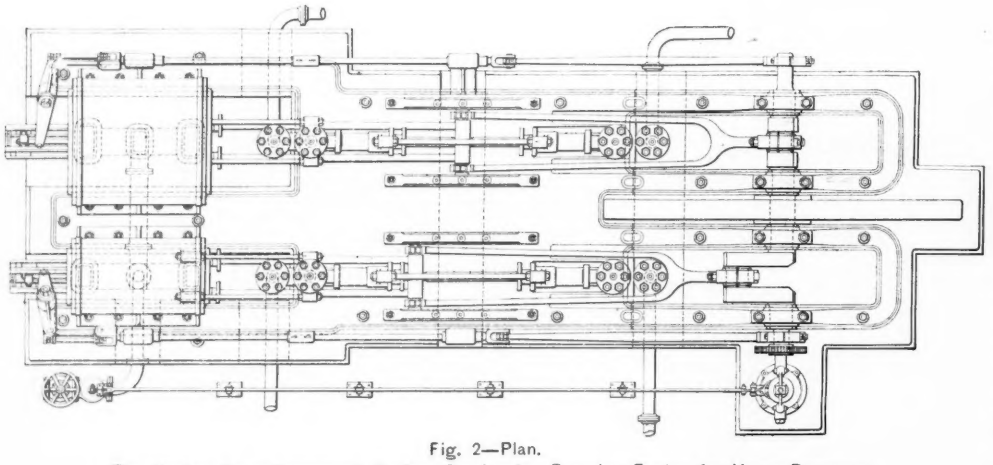


Fig. 2—Plan.

The Naylor, Cross-Compound, Surface-Condensing Pumping Engine for Heavy Pressures.

double acting, with mushroom valves, so arranged that they are independent of the bonnets and reversible. Any cylinder may be cut out of circuit in case of accident and the engine continued in service until repairs can be made.

Figs. 1, 2 and 3 show the pumping machinery, position and relative sizes of the parts and the general appearance of the whole. It will be noticed that the style of pumping engine is a radical departure from the duplex direct-acting-pump, this design being both duplex, direct-acting and flywheel, the steam-valves being controlled by eccentries as in high-class steam engines.

The pumps were designed to take the place of two pairs of tandem compound condensing pumps of the direct-acting type which were not equal to the duty required of them, and whose economy was doubted.

This pump will give 250 gallons of water per minute at 3,000 lbs. pressure and is designed expressly for the needs of hydraulic forging. It works with a steam pressure of 125 lbs. per square inch, or less, and a pressure of 2,500 to 3,000 lbs. is sustained by an accumulator.

The results have been satisfactory. The direct-acting pumps would not work without a boiler pressure of 125 lbs, and the boilers had to be forced to keep steam; it is claimed that these new pumps give 100 to 125 per cent. more water to the same pressure, with 40 lbs. less boiler pressure and 25 per cent. less fuel, and that this is not the result of an expert test, but is every-day practice. The engineer of the United States Projectile Company has made affidavit, to which he has subscribed and sworn, that the new engines do the duty imposed upon them with less than one-half the quantity of coal and at one-half the steam pressure. The engines have separate Wheeler surface-condensers placed beneath the floor and have separate air and circulating pumps. A hot-well has been constructed, but is not yet in use. When the boilers are attached to it a still greater saving in fuel may be expected.

Reference to fig. 5 will show the general plan of the pumps, the piping, the accumulator, and the regulating valves and chains. The eccentric rod, which opens and closes the valves of the steam chest, runs the entire length of the pumping machinery to the extreme end of the cylinder and works upon a rocking beam, giving a very positive action. This arrangement has been made in order to bring the valve connections at the end where they are easily accessible. The steam valves are of the ordinary piston type and are perfectly balanced. A notable feature of the whole plant is that every part of the machinry, condensers, heaters, piping and even the foundation bolts, are perfectly accessible and may be removed and renewed without destroying or remodeling any part of the building, its or the engine foundations.

Fig. 5 shows this arrangement, and reference to it and fig. 2 will give a very clear idea of the whole plant.

The throttle is connected automatically with the accumulator which stops the pumps when it is at its maximum height and which sets them in motion when it begins to descend. It is also supplied with a governor shown in fig. 1 which is designed to check the engines when too great a demand is made upon the accumulator or if a main pipe should burst; the governor flies up and stays there so that the engines cannot run away and damage themselves. The maximum speed is 60 revolutions per minute, but the work required of them is so intermittent that it was necessary to make them self-controlling, stopping and starting automatically, going slowly or up to the full speed as may be required.

The total weight of these engines is 85,000 lbs., and their cost without condensers or hot-well is estimated at about $12,000 each.

The accumulator is 16 ft. high by about 10 ft. diameter, resting upon a piston 12 in. in diameter and 21 ft. lift. This accumulator is loaded with 265,000 lbs. of pig iron, which gives a pressure in the pipes of 2,500 lbs. per square inch.

Pumps very similar to these described are in use in other parts of the country, one at the Brooks Locomotive Works, Dankirk, which supplies 100 gallons at 1,000 lbs. per square inch; one at the Hainsworth Steel Company, Pittsburgh, 100 gallons at 1,500 lbs. per square inch; one at the Altoona shops of the Pennsylvania Railroad, of 100 gallons at 1,500 lbs. pressure. Several smaller pumps have been furnished to different parts of the country, and all have been designed for high pressure and high duty in the operation of hydraulic machinery.

As a comparison these pumps would furnish 10,000,000 gallons of water per day of 24 hours at 120 lbs. per square inch, the ordinary fire service pressure of a city's water-works system.

These pumps are now built by the General Manufacturing Company, of Bound Brook, N. J., which has been recently incorporated primarily for the purpose of building these pumps and other patented hydraulic machinery of Ernest W. Naylor. The offices are in the Havemeyer Building, New York.

Steam Distribution for High Speed Locomotives.

We give below an abstract of the discussion of Mr. C. H. Quereau's paper on the above subject by the members of the Western Railway Club at their March meeting. A synopsis of the paper appeared in our issue of March 9.

LAP, LEAD AND COMPRESSION.

Mr. VOGT: I am in entire accord with Mr. Quereau as to the desirability of increased valve travel, together with considerable outside lap and inside clearance in locomotives for high speed service. In compounds especially does this hold true, and I thought a few representative cards from the same engine before and after changes were made in the lap and inside clearance might be instructive, and have, therefore, had a card prepared showing in dotted lines the form of card given by the engine before the changes were made and while the H. P. lap was $1\frac{17}{32}$ in., the L. P. lap $1\frac{17}{32}$ in., and the H. P. inside clearance $\frac{7}{32}$ in. on each side.

The cut-off marked as fourth notch was a little over 15 in. in 28 in. stroke. The speed was 296 revolutions, or 74 miles per hour. Under these conditions the high-pressure M. E. P. was but 15.76 lbs., and I. H. P. 197. The low pressure also suffered from undue compression, its mean effective pressure being but 12.24 lbs., and I. H. P. but 386.6, a total of 583.6 for both cylinders.

The card shown in solid lines was taken after the alterations, which consisted of changing the H. P. lap to 1.53 in., the L. P. lap to 1.31 in., the H. P. inside clearance to $\frac{5}{16}$ in. at each end, and the L. P. inside clearance to $\frac{3}{4}$ in. at each end.

The compression in the high pressure side was reduced by inside clearance to delay the point of compression. The receiver pressure was reduced by reducing lap of

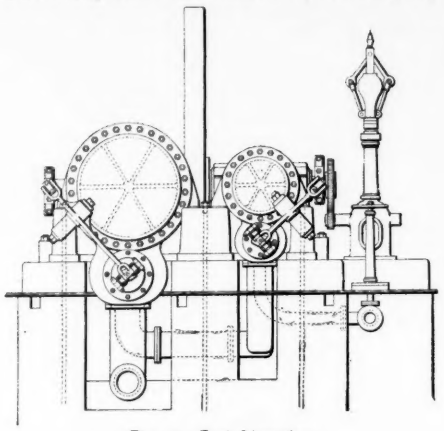


Fig. 3—End Elevation.

the low-pressure valve, thus lengthening the cut-off and using more steam from the receiver. The speed is given as 70 miles per hour. The mean effective pressure on the high-pressure side has risen to 37.03 lbs., and I. H. P. to 436, the L. P. to 16.01 lbs., and I. H. P. to 478, a total of 914 for both cylinders. The cut-off at fifth notch is practically 15 in.

Fig. 2 shows a comparison at 66 and at 67 miles per hour. We now get 1,013 H. P., as against 743 before the alterations were made. Fig. 3 shows cards from the cylinder in solid lines, and from the exhaust cavity in dotted, while the engine was rolling with steam shut off. These cards were taken to ascertain if possible the cause of soot from the smokebox being drawn into the low pressure cylinder, and emphasize the necessity of large relief valves, showing that ours are not large enough, though each has an aperture of nearly 3 in. You will notice that at the ends of the stroke the partial vacuum in the cylinder is supplied from the smokebox.

Mr. JOHANN: I have practiced for the last 30 years giving valves inside clearance, according to the nature of the work the engine is expected to do. I took up that subject first in 1863 with Mr. Hudson, who was then Superintendent of the Rogers Locomotive Works, and begged him to send me engines with the inside clearance that I wanted, and he declined to do it. We corresponded for about three months, and he still persisted in having his $\frac{1}{8}$-in. inside lap. I finally dropped the subject, and as fast as the engines arrived at my shop the steam chests were opened and the valves fixed as I wanted them, and they would take two more cars over the hills than they would with the inside lap. I have done that for the last 30 years, and I fully corroborate Mr. Quereau's statement on inside clearance. I have run them with $\frac{1}{4}$ of an inch inside clearance with entire satisfaction and economy, upon the principle that you want to get the steam into your cylinder quick, and you want to get rid of it equally as quick.

Mr. BARNES: The effect of lead and compression on the economy of an engine is by no means settled. The most economical point of compression is not up to the pressure of admission for locomotives, but at a point considerably below that. I do not understand that Mr. Quereau wishes to say that the lead used in ordinary locomotive practice is uneconomical or disadvantageous, because it is a very difficult matter to prove and I should feel inclined to question the proof of such a statement. One of the best features of the Stephenson link motion is the increase of lead which it gives at a short cut-off and high speed.

Secretary STREET: There is a point in Mr. Barnes' communication that I would like to call attention to. He says: "One of the best features of the Stephenson link motion is the increase of lead it gives at short cut-off and high speed." I believe that a good many roads are coming to the belief that the Stephenson link motion gives too great an increase. The Pennsylvania company has, I believe, nearly if not all its high speed locomotives adjusted with a lead practically constant, and I believe that the majority of foreign builders, English, French and German, use locomotives with a constant lead. I think that it is possible to use a valve motion, which will give the proper lead at high speeds, which will give good results at lower speeds. That is, an engine adjusted with a constant lead, if it is adjusted to give the best results at a high speed, will not work to a disadvantage at a low speed, and therefore I do not think that the increase of lead is necessary to a good valve motion.

Mr. SYMINGTON: On the Baltimore & Ohio they have what is known as the Perkins engines. They have a stationary link which gives a constant lead, and do

better work and make better speed than any other engine of the same capacity.

Mr. QUEREAU: Mr. Street says he does not see how the increase of lead can be an advantage. I will quote from my paper: "It is evident that the clearance space to be filled, and the length of time required to fill it with a given lead and steam pressure, are always the same for a given engine, regardless of the speed at which the piston travels. It is also evident that at 60 miles an hour there is one-fourth the time in which to fill it that there is at 15 miles an hour. It therefore follows that, if a sixteenth of an inch is sufficient at full

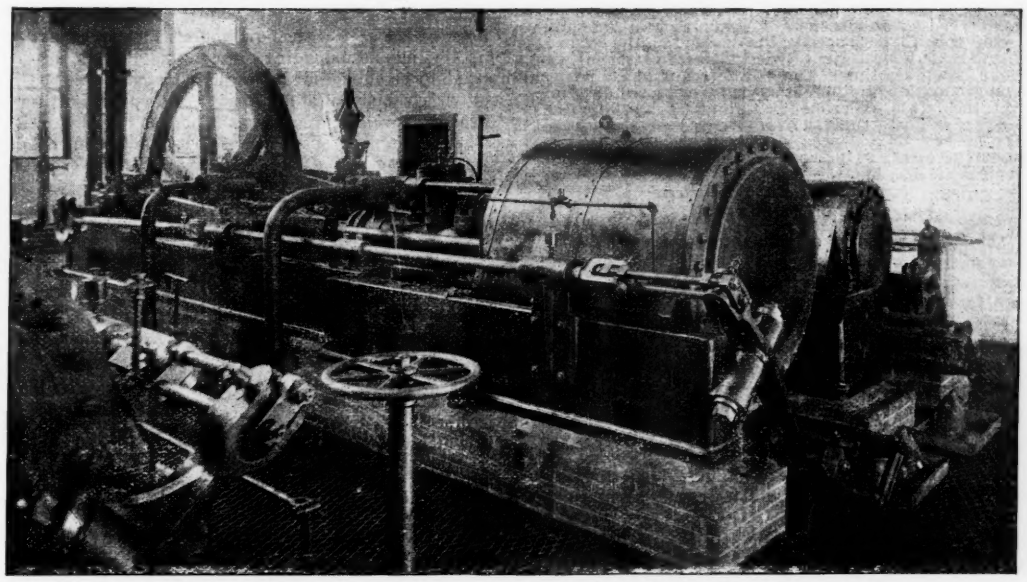


Fig. 4—Perspective View.

gear and slow speeds, it is not sufficient at 6 in. cut off and high speeds." It was not my intention to say how much the lead should be increased for any given engine, because engines differ in diameter of drivers, size of cylinders, etc If the lead is properly adjusted for high speed, it will be too much for low speed. Your engine will be loggy and the rods will pass the center with a thump every time.

THROTTLING.

Mr. MANCHESTER: We have five engines of the same class put in the same service at the same time; there were two engines that made a particularly good performance for coal and for speed. One of them was run by an engineer who was quite scientific in his manner of handling an engine. He was disposed to work with as short a cut-off and wide open throttle as he could. The other was a man who had no particular knowledge of the principles or proper distribution of steam, but had had a great many years' experience on a locomotive and ran his engine with the throttle and the reverse lever in the position in which the engine would do the best work and make the least annoyance to him. This engine has led the five during the four years that they have been in service. The one that was run by the man why was quite scientific has been a close second.

Mr. GIBBS: I believe there is really less injurious throttling practised on railroads to-day than is generally supposed. I think that frequently when an engineer is supposed to be throttling his steam he is not doing so, especially when running at speed. Occasionally, of course, you meet an engineer who will run with a very small throttle opening, up hill and down, but the general practice is to run the engine where it will do the best.

Mr. SARGENT: I have often seen engines with an ample area of throttle opening and yet with a throttle chamber contracted by strengthening ribs so that the actual passage through it was only about one-quarter that of the dry pipe, which would account for the difference found in the apparent throttling and actual throttling because you might have a throttle half open and yet admit all the steam thatwould pass through the chamber.

Mr. MARSHALL: I believe the orders and general instructions to enginemen should be to run with a wide open throttle under all circumstances except the very extreme ones. It will, in the long run, result in economy in operation. At the same time if the udvantages of handling an engine in that way are to be realized, the valve gear should be arranged so that the engine will be an easy riding one under those conditions. The men will argue, and I think rightly, that the engine is not running economically when shaking itself to pieces.

I feel quite confident that a good many engines have cylinders too large for the work they are designed to do, and that the increased power desired could be obtained by improving the valve gear rather than by enlarging the cylinder.

On page 196 an interesting table is given which shows that without varying the cut-off, steam pressure, or the throttle, the cylinder power will decrease just in pro portion to the increase of speed, but as engines are not run in this way as a rule it is well to remember that this rule is true only under this special condition mentioned. Generally as the speed increases the cut-off is made shorter and often the throttle is partly closed.

Mr. QUIREAU: Throttling was treated in the paper in a general way, and it was assumed that the capacity of the engine was such that it would haul the train at its most economical point of cut-off. Under these conditions, I think there is no doubt that the wide open throttle is the more economical, provided that the valve gear is properly constructed. In Prof. Gross's report to the American Society of Mechanical Engineers as to the mounted locomotive in Purdue University, you will find the results of tests at different cut-offs and different degrees of throttling on the economy of the engine. A given speed and pull at the drawbar were obtained for each notch in the quadrant, The paper shows that for a cut-off of 36 per cent. of the stroke, the pounds of coal per I. H. P. per hour were 5.2; for 26.9 per cent. of the stroke, 4.58, and for 18.6 per cent. cut-off, the coal used was 4.69 lbs. These results show that 4½-in. cut-off with a wide open throttle is more economical than an 8-in. cut-off with the steam pinched by the throttle.

THE INDICATOR.

Prof. GOSS: I have a series of cards here, three in number, which I have had superimposed one upon another. They were taken with the same indicator, from the same cylinder and at the same cut-off. The largest card shows 60.8 lbs. M. E. P. at a speed of 22 miles. and the smallest 30.3 lbs. M. E. P. at a speed of 56½ miles. Last fall I started some experiments to determine the the influence of the indicator pipe upon the form of the card. I attached an indicator close to one end of one of the cylinders of our experimental locomotive, and arranged a pipe to connect the same cylinder end with a second indicator located above the top of the valve box. The arrangement of the second indicator was in every way similar to that employed in road tests of locomotives. The pipe used was 3½ ft. in length and ¾ of an inch in diameter. It was carefully bent to shape and covered. Series of cards were taken from both indicators simultaneously, and the indicators were then reversed in position and the work repeated. I found, as the speed increased, a very noticeable difference in the form of the cards. The cards from the indicator upon the cylinder were always much smoother in outline than the cards upon the pipe. It may be that the pipe does not account for all the variations; other vibrations incident to the road may have something to do with it, but my belief is that the pipe has a very considerable influence in producing the wavy line.

Moreover, I found an actual difference in the size of the cards. When the motion of the indicator pencil is slight, as during exhaust, both indicators gave the same record; but when the exhaust valve of the engine closes and there is an acceleration of pressure to be recorded, the upward movement of the pencil of the pipe indicator is slower than that of the indicator on the cylinder. As a result the compression line from the indicator upon the pipe runs lower than the compression line from the indicator on the cylinder. Again, at the beginning of the stroke, the indicators start out pretty well together, but during the rapid fall of pressure, just before and after cut-off, the pipe indicator comes down more slowly and gives an expansion line higher on the card as compared with the expansion line from the indicator on the cylinder. The result is that the card from indicator on the pipe is larger than the card from the indicator on the cylinder. The record shows that for a speed of 56½ miles per hour the mean effective pressure given by the indicator on the cylinder is to the mean effective pressure given by the indicator on the pipe, as 1 is to 1.17; or, if we accept the record of the indicator on the cylinder as true, the showing of the pipe indicator is in error to the extent of 17 per cent. This, however, is an extreme case.

The effect of the pipe depends not only upon the speed, but also upon the range of pressure that is to be recorded, and upon the time when changes of pressure take place. Rapid changes of pressure may be accurately recorded when they occur near the end of the stroke, for the indicator drum is then nearly at rest, but a slight lagging of the pencil from a change of pressure which occurs near the middle of the stroke shows conspicuously upon the card. The results I have given are for 6.6-in. cut-off, 130 lbs. pressure. and for the conditions of speed already mentioned.

Mr. Quereau has undoubtedly used the best information that he could secure, and the result is very gratifying. I have no doubt but that he has mistrusted the pipe, and that other members have done so. My statement may help to give greater definiteness to the mistrust.

It is not the purpose of the indicator to give us square cornered cards, but rather to show us what is going on in the cylinder. If we can rely on the record of the indicator it will serve to check both our theory and our practice.

If we go entirely upon the results of our indicator cards without studying them out in all their parts we may draw some wrong conclusions.

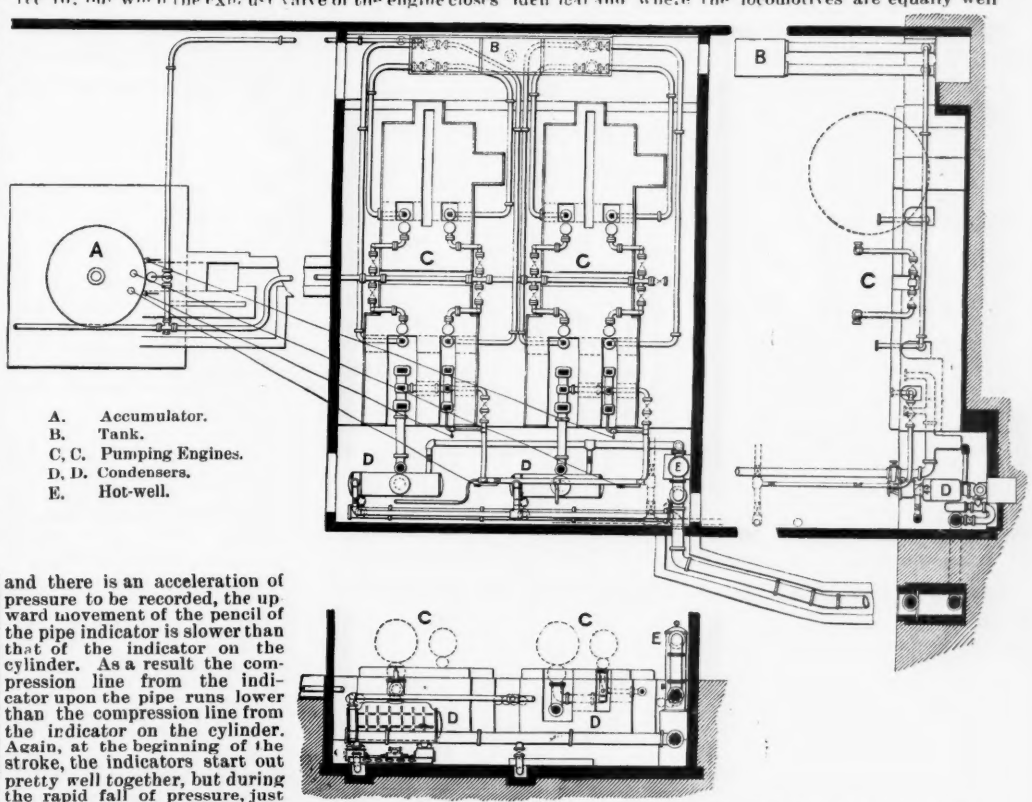
Secretary STREET: I think railway men are fast coming to realize the fact that the indicator is not used to the extent which it should be, and that master mechanics generally have no idea of the amount of valuable information they can obtain by its use. On the other hand, following the indicator too closely in locomotive practice will lead persons astray. With the Stephenson link motion, an increase of the lap will improve the indicator card, but by increasing the lap too much you get an engine that will not start a train at all.

Mr. SARGENT: I think the indicator cards shown by Mr. Vogt, of the Pennsylvania Railroad, illustrates very clearly the difference between theory and practice as regards railroad work. I have no doubt the valve arrangement or the setting of the valves of the compound engine which gave the cards shown in dotted lines were very carefully computed from theory. The use of the indicator, however, showed that the theory was wrong, and they had to be re-set in accordance with the knowledge gained by the indicator.

Mr. QUEREAU: In stationary and marine practice no engine is turned out of a reputable shop without being piped for the indicator, and, as a rule, the engine is indicated when set up. In railroad practice that is not so at all. In fact, the privilege has been asked of indicating every engine turned out of a shop on certain roads and it was denied, probably because it was thought the expense of piping cylinders would not be repaid by the knowledge gained. It seems to me that every locomotive should be indicated, not only when new, but whenever the machinery has been overhauled. I believe it would save railroads money to do it in every case.

Mr. FORSYTH: The 1-10 in. lead on the engine which Mr. Quereau tested is not C. B. & Q. standard. That is one of the things which is liable to occur if you do not watch things on the road by an indicator. You may get engines with an improper lead from the locomotive works, or they may be turned out of the shop in that shape and you don't know it, and it shows the great advantage of looking after these things with an indicator.

Mr. BARNES: At the bottom of page 194 of the February proceedings it is said that "the indicated waters may be safely used within reasonable limits as measuring the efficiency of a locomotive when average cards are compared, taken under like conditions." This statement is only true under conditions that are almost identical and where the locomotives are equally well designed in the cylinders, especially in the bagging and in the protection from radiation.



A. Accumulator.
B. Tank.
C, C. Pumping Engines.
D, D. Condensers.
E. Hot-well.

Fig. 5.—Naylor Pumping Engine. Plan Showing General Arrangement of Pipe Connections.

Mr. RHODES: It may be noticed in the reports that the writer has not hesitated to show some poor work that has been done, and I want to call particular attention to that because if you only get reports of good work, you do not get a great deal of information. The diagrams sent out by the Pennsylvania Railroad are very interesting, and I think the club out to thank Mr. Vogt very much for being frank enough to send us both the good and the bad results obtained from their new engine. The designs originally turned out of their shop show very clearly what can be done by the use of the indicator as advocated in this paper.

HEAVY LOCOMOTIVES AND HIGH SPEED TRAINS.

MR. GIBBS: Large modern locomotives have been a disappointment to a great many motive power men, who say that they do not get proportionately as much work out of them as they used to get out of the small engines they have displaced. I think this disappointment arises in a good many cases from a misapprehension of the conditions. They are comparing the performance of these modern engines on trains which have become heavier each year and are hauled at a much higher average speed than formerly, and consequently the drain on the boiler from this cause, or from the increased weight of the trains, is enormously increased. Now, it seems to me, if we think these modern engines do not haul as heavy trains as they should with their weight and size we might understand it if we took the speed into consideration. Of course there is another factor of the question; with larger boiler, heating and grate surface, combustion is not forced to the same uneconomical extent that it is in smaller engines worked habitually to their utmost power, the strain on machinery and the general wear and tear are less.

MR. DELANO: I have thought that a careful study of simple engines would show that there were chances for economy in them, which would meet the most daring figures of the most enthusiastic man on the subject of compound locomotives. I do not wish to be understood as saying this for the purpose of throwing cold water on the compound idea. It seems to me that the difficulty is that the use of the indicator is altogether too limited in locomotive practice. This question of steam distribution on high speed engines is not limited to engines running on high speed passenger trains, because practically all engines, except switching engines, are now being required to makehigh speed. What I mean by high speed, is high piston speed. Mr. Ely has brought out the point that high speed trains are simply a question of distribution. If you can keep the track clear for such trains you can get over the road.

MR. BARNES: The statement that "to increase the capacity for speed of any locomotive its power must be be increased, and at least by as much as the speed is to be increased," is probably true for constant speed after the speed has reached 60 or 70 miles an hour, but it is not to be taken as true for a change from 30 to 60 miles an hour.

It is the reduction of wages of trainmen, the increased safety and the greater capacity of a given piece of track that arises from heavy trains that has induced railroads to use heavy locomotives. Of course the reduction of the cost of motive power naturally follows, but this is an incidental advantage and not the primary reason for the use of heavier engines.

I do not understand that "there is a growing conviction in Europe that the economical length of trains has been reached, and there is therefore a movement toward increase of speed." In Europe, as in this country, not only are train weights increasing, but also the weights of locomotives. The increase is slower, however, in Europe than here.

President FORSYTH: I will call attention to a paragraph in the early part of the paper where it is said: "If we further consider that it requires more power, hence more steam, to maintain the higher speed, it is plain that the high speed engine will use more than twice the amount of steam necessary for the slower engine." I do not understand what Mr. Quereau means when he says that it requires more power and more steam to *maintain* higher speed when the engine is working at a much shorter cut-off. The amount of steam used at 60 miles per hour is evidently twice the number of revolutions multiplied by a smaller volume or weight per revolution, which must make a total less than double that at 30 miles per hour.

I think it is a mistake to assume that there is a great increase of resistance due to speed. I think it is a mistake to think that this resistance increases as the square or even directly as the speed increases. If we got any teaching from our dynamometer experiments in the passenger train tests, it was that the passenger train resistance at uniform speeds of 50 or 60 miles an hour is only about 12 pounds per ton, and just the same as it was at 20 or 30 miles an hour.

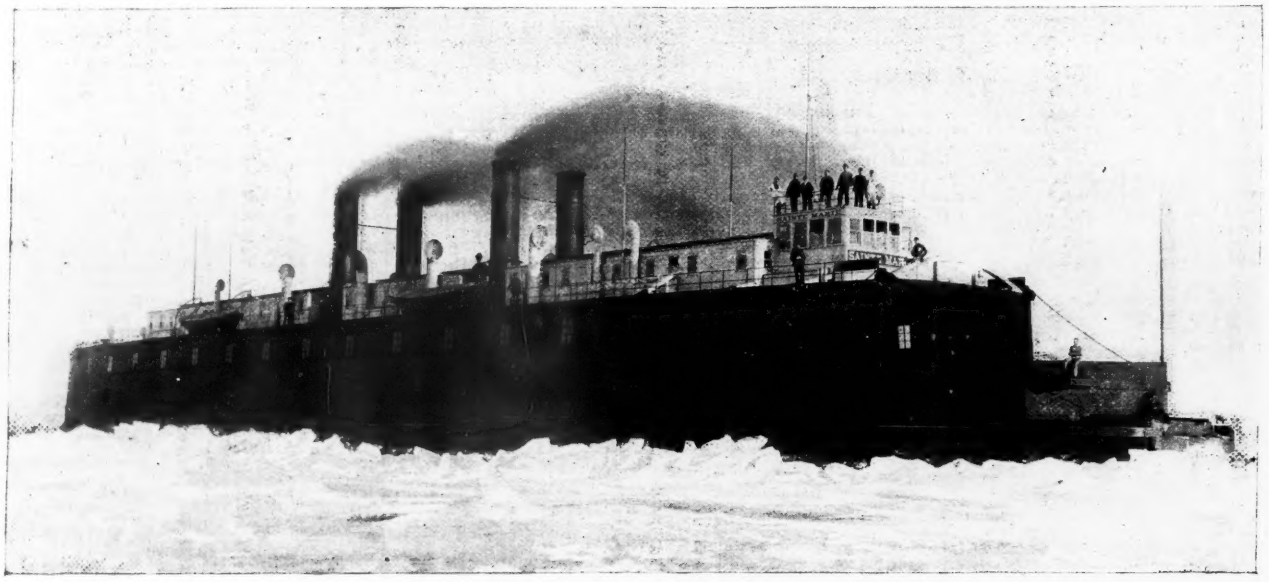
I have been looking over the speed diagram of our fastest express train, the Denver Express, and find that although we made only six or seven stops in a run of 163 miles, the engine was accelerating the train from a slow speed to a higher speed during 43 per cent. of that run; so that instead of running at a uniform speed over a good portion of the road, the engine, due to the stops and irregularities, was accelerating the train most of the time. It is this acceleration, due to stops and to places where the engine has to slow down and get the train up to speed again, which calls for the increase in power in high speed engines. Higher speed is influenced by track arrangements, and it is a thing for the track people to take up, and reduce the grades, and put in interlocking signals, so as to reduce the number of stops. The most encouraging thing, I think, that we have in the matter of compound locomotives, is this report from the Pennsylvania road, where they show at 70 miles an hour they have developed 914 H. P. It is the greatest horse power I think that has ever been reported at such a high speed. That has been accomplished with a compound locomotive, and it shows that the distribution of steam in that type may enable us to develop this high power at high speeds where it could not be obtained in a simple engine.

MR. QUEREAU: I think President Forsyth is in error in saying the requirements of power are not as great at high speed as at low speed. Assuming that the power is the same for both speeds, the demand on the boiler at 60 miles an hour is just twice what it is at 30 miles an hour in a given time. The power required to keep a train in motion at different speeds is a mooted question, but the latest experiments and latest investigations seem to indicate that the formula $\frac{1}{4}$ v plus 2 is about the correct one for passenger trains. I think that the steam necessary to increase the speed of a train must increase faster than the speed.

The Transfer Steamer Ste. Marie.

On page 192, volume of 1893, we gave a short description of the transfer steamer Ste. Marie which was built last year by the Detroit Dry Dock Co., from the designs of Mr. F. E. Kirby, Constructing Engineer for the Mackinaw Transportation Co., for the car transfer service across the Straits of Mackinaw. We can give now a more complete description with an engraving giving a general view of the vessel.

That her service is not all in summer seas will be evident from the engraving, made from a photograph. Her freeboard with an ordinary load of 18 freight cars on board is about nine feet, nearly all of which is seen to be needed on this trip and which was not an unusually difficult one. Last autumn, as soon as the ice became heavy enough for a trial, Commander Captain Boynton ran out of his usual course until he found a field of clear ice, which proved on measuring to be 27 in. thick. The vessel cut through this without serious difficulty. She was stopped in this field, and started again without reversing the engines and backing clear.



The Transfer Steamer Ste. Marie.

The Ste. Marie is 269 ft. 6 in. in length of keel; 302 ft. moulded length on deck; breadth, 51 ft. 6 in. and molded depth, 24 ft. She has three tracks on the upper deck, sufficient for 18 freight cars.

The hull is unusually strong, and is said to be the heaviest wooden hull on the great lakes. It is of oak for the most part, some long-leafed Georgia pine being used for deck beams and track stringers. The frames are 12 in. thick by 24 in. deep on the keel; she has 15 keelsons, none less than 14 in. square, and is planked with 6 in. of oak, sheathed with steel, up to one-quarter of an inch in thickness.

An important factor in her success is her fine form under water, her coefficient of displacement being less than five tenths. Her power to break ice would be uselessly expended if the form of the hull permitted loose ice to cling to her and wedge around her as it does around an ordinary vessel. In fact the builders say that no amount of power that could possibly be applied would make a vessel of the usual freight type do her work.

The upper deck of the hull proper carries the cars only, the cabins being on the hurricane deck, 25 ft. above water. The sides are sheathed, keeping the cars entirely under cover in transit, and incidentally relieving timid passengers of the sight of the seas in heavy weather. The length of the trip and number of passengers carried call for somewhat elaborate arrangement of passenger accommodation in way of dining saloon and toilet rooms.

Her power is furnished by four double-ended boilers, 11 ft. 6 in. diameter and 17 ft. 6 in. long, working at a pressure of 120 lbs. per square inch. The power is applied by two vertical inverted compound engines, of about 2,500 ind. H P for ordinary working. The bow engine has cylinders 28 in. and 52 in. diameter by 40 in. stroke, and the after engine 32 in. and 58 in. diameter by 48 in. stroke. The air pumps are of the Worthington independent duplex type, the size of the forward one being 12 in. to 15 in. × 15 in., and the after one 14 in. to 19 in. × 15 in. The feed pumps are also independent of the main engines, leaving only the bilge and cooler pumps to be worked at the expense of propelling power.

The auxiliary machinery comprises also an electric light engine for a plant of 300 lights and a search light, four steam gypseys for handling lines, and an engine for hoisting the gate at the bow under which cars must run in loading and unloading. Among her special fittings might be noted four hydraulic ash ejectors, by the use of which the labor of getting the ashes overboard is reduced to shovelling them into the hopper in the fireroom. The fireman opens the valve, shovels in the ashes, and the machine does the rest.

The Ste. Marie is fitted with two "anti-rolling tanks" between decks, similar to those on the St. Ignace, which reduce the rolling of the vessel in a remarkable degree.

Air Brakes on Freight Trains.

At the meeting of the Central Railway Club in Buffalo on March 28, the principal subject for discussion was the Maintenance and Inspection of Air Brakes in Freight Service, on which a paper was read at the January meeting by Mr. J. A. Chubb. Mr. Chubb emphasized the necessity of having specially trained inspectors, the work being quite different from that with which the ordinary car repairer is familiar.

Previous to the discussion Mr. Chubb read a letter from W. M. Kinch, Assistant Superintendent of Signals on the New York Central, stating that air is being conveyed through a 2-in. pipe 18 miles on the Harlem division of the Central, supplying to interlockings, automatic signals, small engines for running dynamos, blacksmith forges, etc., the source being a compressor at the extreme end of the line, with another for emergencies near the other end. The loss of pressure at the far end is only about 15 per cent. The pressure at compressor never exceeds 80 lbs. and most frequently the gage shows 75 lbs.

President Waitt explained the special carding system for defects in use on the Lake Shore which has proved effective and successful. Mr. Waitt believes that the use of air brakes will lead to the establishing of terminal plants for making tests. This had already been done by the New York Central. It will require the payment of repairs for defects which were not developed under any other arrangement. Another feature is the thorough instruction of employees in the operation and construction of air brakes by means of a car fitted up with the apparatus. This is the practice on the Lake Shore where a car is maintained, and the men receive a certificate when they pass an examination. Mr. Waitt favors a modification of the rules of interchange so as to provide that maintenance shall be charged to owners of cars when repairs of defects are not required by reason of accidents or wreck.

Mr. Mitchell, of the Erie, said that on his road an air-brake school had been located at each division terminal shop, with a man in charge, who is required to give instruction to any trainman who seeks information. This was better than waiting for the air brake car to arrive.

Mr. Higgins, of the Lehigh Valley, wants an arrangement which will prevent people closing the stop-cocks who have no business to meddle with them. On the Lehigh Valley a division terminal shop school would not be practicable.

Mr. West, of the Ontario & Western, suggested that the danger from unauthorized closing of cocks could be guarded against by making an application of air at 1,000 yards after leaving a terminal point. This was the practice on his road.

Mr. Bronner, of the Michigan Central, was of the opinion that, as the use of air brakes increases, plants will have to be established for proper testing, and the repairing of defects. It was the experience of his road that the closing of angle cocks on the tender occurred most frequently, and for this reason all such angle cocks have been removed.

Mr. Chubb said that every one of these cocks having been removed, no more trouble from this source was expected. Experience had shown that if angle cocks were found closed in the train line it was due to the failure of the trainmen to open them. In Mr. Chubb's

opinion the use of angle cocks in passenger service was entirely unnecessary.

Mr. Petrie explained how the testing plant of the New York Central at East Buffalo is constructed and operated. An experienced man is employed to take charge of it. It is not the custom to test each car separately, when 10 or 15 can be coupled together. Repairs of some kind have to be made to about 20 per cent. of cars equipped with the air-brake and not one car in 1,000 has to be switched out for repairs.

Mr. Small (B., R. & P.) stated that a plant was maintained on that road similar to that of the New York Central and the results were the same.

Mr. Sutherland, of the Chicago & Grand Trunk, favored an instruction car, no man to be given a place until he is able to pass an examination.

Mr. Miller (N. Y., C. & St. L.) reported that all his engineers, firemen, conductors, inspectors and brakemen had been required to go to school on the air-brake car. The result is that all are well educated and the amount of air used has been reduced two thirds. Rough handling of cars is of rare occurrence. When it takes place the engineer is taken off and sent to school again.

The Lake Shore, President Waitt said, has a test plant at Cleveland and another at Toledo. Six more have been recommended to be established at large interchange yards.

Mr. Mitchell expressed the opinion that once a year was often enough to oil brake cylinders, with the average mileage of 20 miles a day that freight cars are making. Mr. Chubb said this was the experience of the Michigan Central. He had found cylinders that were fairly well lubricated at the end of two years.

Master Mechanic Miller and Chief Inspector Miller of the Nickel Plate favored an extension of the present time for oiling. Mr. McCarthy was of the same opinion.

Best Method of Handling Defective Air-Brake Cars.

The committee appointed by the Western Railway Club to look into the matter of handling freight cars with defective or inoperative air-brakes submitted at the March meeting a report calling attention to the fact that some method of reporting defects in air-brakes by trainmen or inspectors, who cannot repair the defects at time of discovery, is very important and essential. It has been the custom on a number of roads to have trainmen do this by telegraphing to Division Superintendents; but this method has many and decided objections, and the committee is of the opinion that a far more satisfactory method of reporting such defects is by the use of a small card, filled out by the conductor or inspector discovering the defects, and applied to the car at once. This ticket would be an indication to yardmen or trainmen at once that the air-brake was defective, and in many cases what the defect was, and hence would be the result of saving quite a little in delayed time and in switching at terminal and junction points, where trains are broken up and reassorted.

The form of card designed by the committee is a slight modification of the form which has been put into use on the Lake Shore. The card is printed on two sides. One side is intended to be used when the air-brake itself on a car is inoperative, but the train pipe and attachments in such a condition than the car can be used between other air-brake cars with the air-brake cut out. The reverse side of the car is intended to be used when the air-brake is so defective that the car must be treated exactly as a common brake car. A line is left on which to fill in the nature of the defect for which the card is put on. There are also some blank spaces on the end of the card, in which the car repairer will fill in the place, date and nature of repairs made to the car.

The card proposed has a stub similar to that used by the Lake Shore, which might be of use to Master Mechanics, Superintendents of Motive Power, or Master Car Builders in keeping a double check on the use of the cards and on the nature of the repairs.

The committee considered the advisability of a report form similar to that used by the Northern Pacific, on which conductors report to Division Superintendents the number of cars with defective air-brakes in their trains and the nature of those defects, and concluded that the card system was superior to a report, although the use of a report, either in addition to or supplanting the card system might be advisable on roads having air-brake testing and repairing plants at all principal yards.

The committee is of the opinion that it is exceedingly desirable that some uniform style of defective air-brake card be adopted, and suggests that the Master Car Builders' Association be requested to appoint a committee to recommend a form of card for general use by any or all roads who may wish to use such a system.

F. A. DELANO, Chairman,
A. E. MANCHESTER, } Committee.

Concurs, but very much prefers the air-brake defect card in use on the Chicago & Alton Railroad.

J. TOWNSEND.

A Power-Feed Sandpapering Machine.

The illustration shows an improved three-drum, eight-roll power-feed sandpapering machine, manufactured and sold by J. A. Fay & Co., of Cincinnati, O.

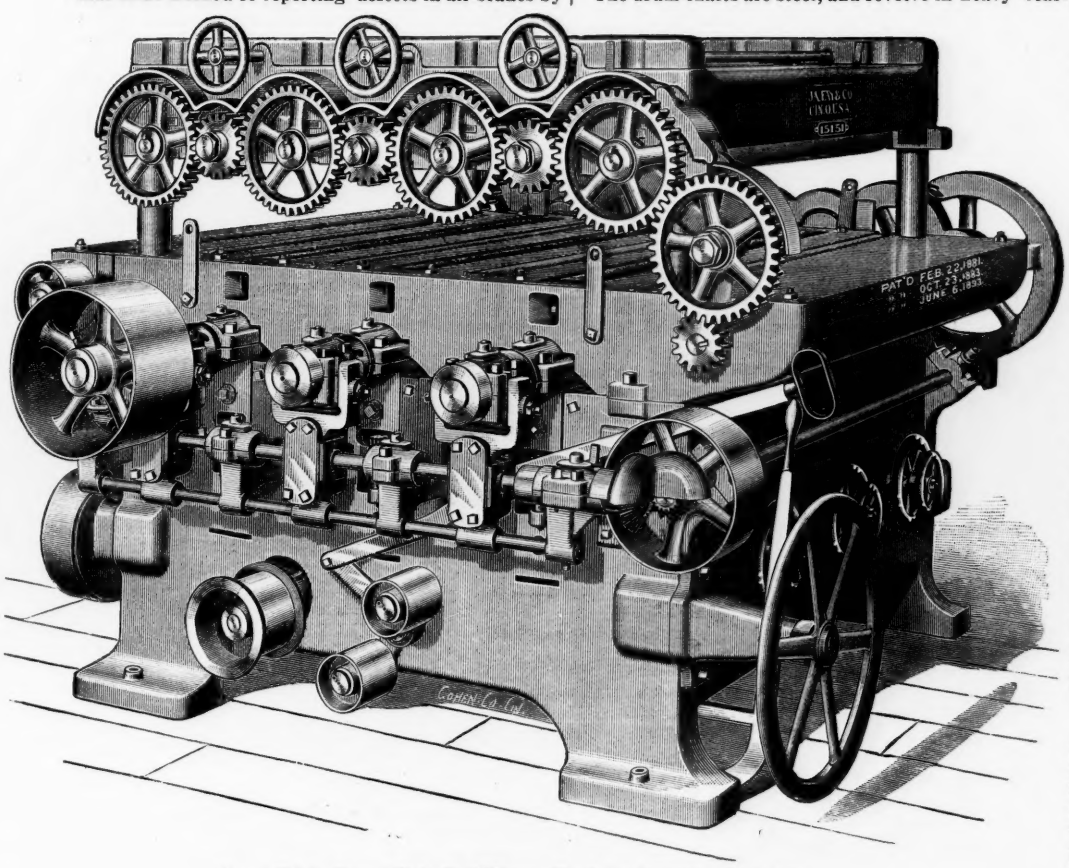
This machine is designed to sandpaper planed surfaces of parts of furniture, pianos, wagons and cars; for panels, doors, or any class of work requiring a perfect surface either for varnishing or painting. It is a heavy and substantial machine, and combines in its construction the latest improvements which an extensive experience can suggest. It is made to work panels, etc., 30, 36, 42, 48, 54 and 60 in. wide.

There are three drums, made of steel, upon which sandpaper is placed and graded. The first drum carries a coarse grade of paper, the second drum a fine grade for smoothing, and the third drum a finer grade for giving the material the polished surface. Each drum has an oscillating or vibratory motion laterally across the material to prevent the formation of lines which would result if the revolving motion was direct.

The drum-shafts are steel, and revolve in heavy bearings, gibbed to the sides, and with adjustments to lift both ends of the drums at once, or either end separately for alignment. The drums can be easily removed by raising the entire roller and bed-frame, which opens a space directly over them sufficiently to lift them out and over their bearings. This raising device is operated either automatically by a system of gearing or by hand by the screws at the four corners of the machine. The adjustment of the drums for the difference in heavier or lighter cutting is done by the movement of the three handwheels at the end of the machine.

There are eight feeding-rolls, four above and four below the platen, driven by a train of heavy expansion gearing, and giving a very powerful feed. The work passes between the upper and lower sets, which will receive 8-in. material. The lower rollers are placed one on each side of each drum, each roller is located in a separate bed-plate which is adjustable with the roller. Each bed-plate can be set to gage the cut, or all the bed-plates can be set in line and the drums set to the cut desired. The upper rolls are in a frame over the corresponding lower rolls. The pressure rolls are three in number, one over each drum to hold the material firmly to them, and they are separately adjustable by hand-wheels. The feed is governed by a double belt-tightener operated by a hand-lever. A brush attachment is provided to clean the material as it passes finished from the machine.

The machine was awarded a medal and diploma at the World's Fair, and should be a valuable machine in every shop where passenger car work is turned out.



No. 4 Triple Drum, Eight-Roll, Power Feed Sandpapering Machine.

The Management of Terminal Freight Yards.

At the meeting of the Central Railway Club at Buffalo March 28, Mr. J. B. Morford, of the Michigan Central, read a paper on this subject. He referred to the necessity of complete facilities in these days of competitive freight when trains have to be run at high speed, and to the annoyance caused by insufficient room in yards when great efforts had been put forth to run a freight train several hundred miles at 35 or 40 miles an hour. Continuing, Mr. Morford said:

"A typical yard at an interchange point, in my opinion, should be a poling yard for the breaking up of trains, with ample track room sufficient to promptly handle all traffic that might be presented. With a poling yard one engine with a yard conductor and five helpers, and an engine conductor and two helpers, nine employees all told, would do the switching that five or six engines are doing at the present day in the old style of yards. On the arrival of each train the switchman in charge of the poling engine receives from the car checker a list showing him where each car on each train belongs. The conductor takes his switching list and marks each "cut" in this train, one of the helpers is placed at the switches, one uncouples as cars are poled and three do the riding. The car is marked with chalk on the end by the yard conductor designating to the switch tender which track the next car that is poled is to go on, and so it goes on until all the train is grouped. The feeding engine has another train ready to go through the same process. In this way a train of 40 cars is grouped on an average of 15 minutes, 160 cars an hour, or 2,000 cars in 12 hours (a day's work), with a possible delay to the freight of 45 minutes from the time of arrival to the time of departure. The work of each employee connected with the poling yard is systematized.

The difficulties in a terminal yard are the lack of proper carding of cars, prompt forwarding of the billing and not having sufficient track room to get trains in quickly. The road doing a competitive business should have a few miles of double track to be able to dispatch its outgoing trains when made ready, and not be obliged to wait for an incoming train to arrive.

Cars on arrival should at once be carded, using a different kind and colored card for each road. Chalking of cars I find does not work well, as in severe storms the chalk rubs off and the yard masters have no carding to switch by. With colored cards yardmen soon become conversant with them and know them at a glance. . . .

The Missouri River.*

BY O. B. GUNN, C. E.

ITS PHYSICAL CHARACTERISTICS.

The physical characteristics of the Missouri River are perhaps more remarkable than those of any other navigable stream on this continent. It takes its rise among the foothills of the Rocky Mountains, in about 45 deg. north latitude, where geographers have located its "head," at the junction of three considerable mountain streams, called, respectively, the Jefferson, Madison and Gallatin. This point is 2,908 miles above its mouth, at an elevation of 6,800 ft. above the ocean. From this point it meanders northerly 264 miles to Ft. Benton, the extreme head of navigation, where its elevation above sea level is 2,845 ft. Thus, in 264 miles from its source, it descends 3,955 ft., or about 60 per cent. of its entire fall from its head to the mouth of the Mississippi and an average of 15 ft. per mile. Of this great descent 512 ft. is at Great Falls, 75 miles by river from Ft. Benton, where there are several perpendicular falls, cascades and rapids, covering a distance of 12 miles, the greatest being 96 ft. vertical descent. This magnificent water power far exceeds in power and volume the famous falls of St. Anthony, at Minneapolis, and it is being rapidly utilized. Great Falls, only 11 years old, is a rapidly growing young city of 10,000 inhabitants. . . .

The length of the Missouri River, from its source to its mouth, is 2,908 miles; from thence to the mouth of the Mississippi is 1,286 miles, making together a combined length of 4,194 miles, and easily the longest river in the world. The distance would reach from New York to San Francisco, and thence half way to the Hawaiian Islands. Ft. Benton, the head of navigation, is 3,930 miles above the mouth of the Mississippi. In its long and tortuous course, from its source to the sea, its waters traverse 23 deg. of latitude and 22 deg. of longitude.

The Missouri River, alone, drains an estimated area of 519,400 square miles, a surface greater than the combined surfaces of Great Britain, France, Prussia, Switzerland, Belgium, Holland and Denmark. . . .

This great river is noted for its rapid current, exceeding that of any other navigable stream; for the vast amount of sediment held in suspension in its waters and borne onward to the sea by its impetuous current; for the number and magnitude of its sandbars, which appear so suddenly and disappear so rapidly; for the great number of "snags," which lie hidden beneath the murky waters of its treacherous current; and for the extreme fickleness of its very crooked and uncertain channel. The actual course of the river, meandering as it does through the sandy bottoms, impinging against the rocky bluffs first on one side and then crossing over a crooked stretch of several miles to the opposite side, is often nearly double the distance of straight lines from one salient point to another. . . .

The river always carries in its waters a large amount of sediment; the largest amount in times of floods, and the least in the winter, when the water is very low and its current greatly retarded. Sometimes the sediment in suspension is so great that a silver dollar cannot be seen at a depth below the surface of the water greater than its own thickness.

* Extracts form a paper read before the Engineers' Club of Kansas City, March 12, 1894.

The river has many large affluents entering it from both sides, the largest being those entering it from the West, and are: the Yellowstone, in Montana; the Platte, in Nebraska; the Kansas or Kaw, in Kansas; and the Osage, in Missouri. Strange to say, while all these streams are of great length and drain great areas of country, none is navigable, except the Yellowstone and Osage for short distances and for small steamers. The Platte is nearly 1,000 miles long, and yet it is not navigable at all. It is a very wide, very shallow, and altogether a very sprawling stream, its width, sometimes a mile or more, being often cut up into several channels, by islands and sandbars. It rises, in times of freshets, scarcely more than five feet above low water mark. The Kansas River, including the Republican River, which is its longest affluent, is about 800 miles long, and was once considered navigable as far as Ft. Riley, but this early idea proved a fallacy, as the numerous bridges crossing it near its mouth bear testimony. . . .

The finer and lighter portions of sediment are held in suspension, and are carried forward in the rapid current. The coarser sand, too heavy to be carried in suspension, is pushed along the bottom of the river from the higher points in the bed of the river to lower points, where it is deposited. This heavy sand often forms drifts, at the bottom of the river, on a small scale, precisely as we see snow drifted on the open prairies. It is estimated that one tenth of the deposits in the Mississippi delta are made by this pushing force at the bottom of the river. Added to what is brought from long distances, the constant action of the current at the

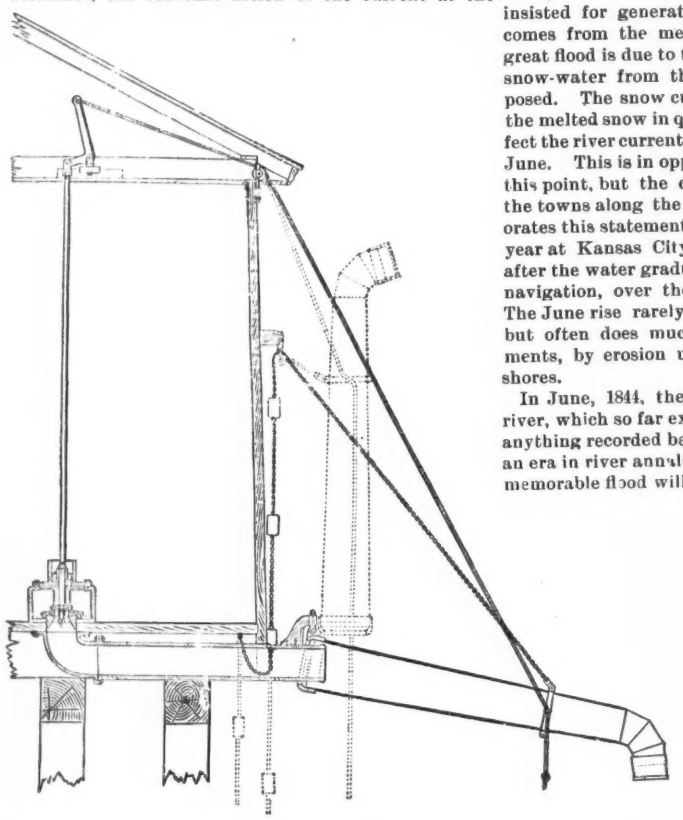


Fig. 1.—Tank Valve.

river curves often rapidly cuts away the loosely packed alluvium shores, and tumbles them, slice by slice, into the current; and these constant additions are quickly taken up and carried forward to be deposited at some other point. Where this sediment strikes "dead water," or water outside of the main channel, where from any cause the current; is greatly retarded, the heavier sediment is rapidly deposited, and this constant action causes sand bars to form, and often, after forming into islands of considerable extent, and being grown up into considerable forests, a sudden change in the main current, during a spring flood, will cut these sandy deposits all away, in a few days, and the main channel will take the place of the former island or sandbar.

About eight or ten years ago an island of this kind was formed in the river, directly in front of the packing-houses, upon which was located the city pest-house, and from the circumstances it was known as Pest Island. This island disappeared about five years ago, and now the main channel of the river occupies the same place. Many a farmer has stood helplessly by and seen his farm, upon which he has spent the best years of his life in clearing it of timber and subduing it for agricultural purposes, cut away, slice by slice, drop into the river and disappear in the hungry waters.

When the river attacks the forest lands in the same way, everything falls before its resistless current. Trees are undermined and fall into the stream. These are swung out into the mad current, and are swept downstream, often tree top foremost. Finally they and on a sand bar, or in shoal water, or in some bend of the river, and soon are partially submerged in mud and silt. The next rise in the river may partially undermine them and drop them deeper in the sand and mud. This process is repeated year after year, until the trunk of the tree is securely and permanently embedded, the small limbs broken off or worn away, and several of the main limbs worn smooth and slippery, their sharp ends projecting downstream, submerged in high water, and thus form the dangerous "snags" so much dreaded by river pilots.

This river has three principal annual rises or floods. The earliest is usually of moderate dimensions, and often insufficient to attract general attention. It immediately follows the breaking up of the ice and the opening of spring. It was on this rise that the steamboats formerly made their first of the season trips, and the foremost steamer was entitled to wear the "horns" during the year as a mark of distinction for enterprise and activity.

The second rise is the April rise, and this is often of considerable proportions; indeed, occasionally exceeding the following June rise, as it did in 1875 and again in 1881. In fact, the great April rise of 1881, which culminated here the last of April, was the greatest flood that has occurred in the river since the memorable June flood of 1844. The April rise is caused by the melted snow-water from the mountains and the plains of Montana, Nebraska, Iowa and Dakota, augmented by rains all along the line, and depends upon these for its proportions.

Generally the June rise is the one that most attracts public attention and calls out the prognostications of the "old river men," who are supposed to know just how high the river will rise, when it will reach its climax, and how much damage it will do, and who have insisted for generations that this great annual flow comes from the melting snow in the mountains. This great flood is due to the May and June rains, and not to snow-water from the mountains, as is popularly supposed. The snow cuts no figure in the June rise, as all the melted snow in quantities sufficient to materially affect the river current passes Kansas City before the 1st of June. This is in opposition to the popular belief upon this point, but the correspondence of the writer with the towns along the upper Missouri River fully corroborates this statement. The June rise culminates every year at Kansas City about the 1st of July, and thereafter the water gradually recedes until it is too low for navigation, over the numerous shoals and sandbars. The June rise rarely does much harm by its overflow, but often does much damage by its rapid encroachments, by erosion upon the rich farmlands along its shores.

In June, 1844, there was a wonderful flood in the river, which so far exceeded in mammoth proportions anything recorded before or since, as to have become an era in river annals, and the high-water mark of that memorable flood will astonish those who choose to investigate it, and it will surprise them still more to learn that the great bulk of it came out of the Kansas River. The government records show that the water reached a point a little more than 10 ft. higher than the April rise of 1881, which all will remember as having done much damage by the overflow of a large part of the lower bottom lands of the Missouri Valley, inundated Harlem and all the lower portions of the east and west bottoms, as well as of Kansas City, Kan. Imagine, then, the consternation and damage that would ensue if the river should ever again touch the high water mark of 1884, and the Valley of the Kaw as well as of the Missouri be inundated and submerged by a flood 10 ft. higher than that of 1881, turning the fruitful valley into a vast lake from bluff to bluff, driving out all the inhabitants and destroying millions of dollars worth of property. . . .

The high water mark of 1844 is well attested by those yet living, who remember it well, and also by the record of the government engineers. It is engraved upon the south land pier of the Hannibal & St. Joseph Railroad bridge, where it is plainly visible about six ft. above the Missouri Pacific Railroad tracks.

(To be continued.)

New Tank Valve and Stand Pipe.

The tank valve shown in Fig. 1 and the stand pipe shown in Fig. 2 are improved devices which have recently been put on the market, and are claimed by their makers to be somewhat better than anything heretofore offered in this line.

The tank valve is operated by a rope as is the case with other tank valves, the improvement being in the valve itself. The valve is in two parts, a small valve above the main valve. The small one offers very little resistance to being raised, and, by means of the hollow rod extending from the top of the tank, it moves ¾ of an inch before the main valve starts to lift. By thus relieving the pressure from the large valve, this valve is more easily raised. The seating of the valve is just the reverse—the large valve seats first and then the smaller one. The hollow rod admits air to the discharge pipe so that, after the value is closed, the pipe drains quickly. This construction of valve, it is claimed, prevents the hammering and resulting leaking common to some types of valves.

The valve used in the stand-pipe, as shown in fig. 2, is very similar to the tank valve; the difference being that the valve rod, extending up through the pipe, is not necessarily hollow, and a dash pot is connected with the valve spindle to prevent hammering. The pot is always full of water which is forced out through small holes by the movement of the piston. A relief valve is placed above the main valve and can be adjusted for any desired pressure. The stand-pipe is carried on steel rollers working on an incline; the incline

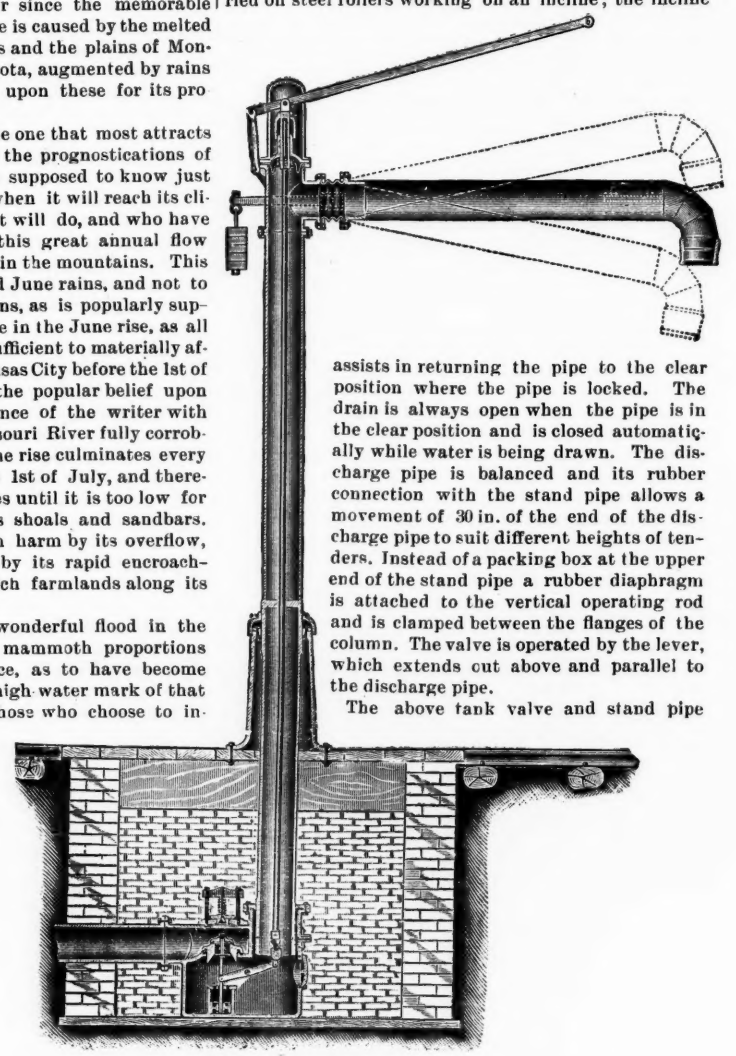


Fig. 2.—Stand Pipe.

assists in returning the pipe to the clear position where the pipe is locked. The drain is always open when the pipe is in the clear position and is closed automatically while water is being drawn. The discharge pipe is balanced and its rubber connection with the stand pipe allows a movement of 30 in. of the end of the discharge pipe to suit different heights of tenders. Instead of a packing box at the upper end of the stand pipe a rubber diaphragm is attached to the vertical operating rod and is clamped between the flanges of the column. The valve is operated by the lever, which extends out above and parallel to the discharge pipe.

The above tank valve and stand pipe are manufactured by the Stilwell-Bierce & Smith-Vaile Company, of Dayton, O. The Western agent is Mr. F. H. Jones, 63 South Canal street, Chicago.

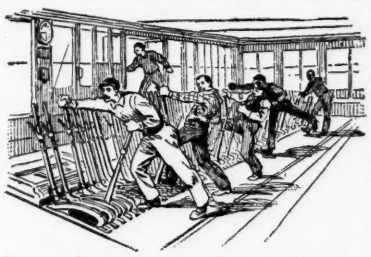
The "Lady" Signalman.

The female railroadman seems to find her most congenial field in West Virginia. Our readers will remember the beautiful idyl, fully reported in these columns, wherein the "young lady engineer," with a blue suit (trimmed in Moorish style) and a jaunty cap, was engaged to take a train of 97 freight cars from Wheeling or somewhere to the World's Fair, without a stop and with a 15-in. cylinder. We never heard of the arrival of the train at Jackson Park, and the melancholy truth, that the whole story was a "fake," is now universally accepted, we suppose. Now we have a more prosaic story to tell, but it is truthful. Mr. Sperry, the Western agent of the Johnson Railroad Signal Company, sends us a letter from Superintendent Gill, of the Western Division of the Chesapeake & Ohio, showing how successful West Virginian women have been as operators in towers where switches have to be thrown. Mr. Gill says:

There are three places on the Greenbrier district of this road where "lady operators" are required to attend to the switches. At Rockland, one lever moves both switches of the crossover and it is operated without any effort. At Wolf Creek, one lever throws two switches, two detector bars and two locks; this lever is rather stiff on account of not being used very frequently, but the operator has no trouble in manipulating it. At Lowell, the levers are not loaded at all heavily and they work very easily. When these machines are put in properly and kept cleaned and well oiled, "ladies" have no difficulty whatever in handling them very successfully.

The traditions of the *Railroad Gazette*, which had a susceptible bachelor on its editorial staff for many

years, compel us to compliment these ladies—on something; but we do not know whether to mention their muscular powers, and thus offend the maker of the apparatus, or their powers of persuasion, which they may have used to induce the section master to keep the switches and connections unusually well oiled; and that will offend also. "The lady operators" in the block signal towers on the Chicago, Burlington & Quincy, in the wild regions some 10 or 12 miles west of Chicago, are much complimented, by those who know them, on their bravery, the isolated situation of the towers making their lives very solitary; and on the whole we think that bravery will be the most appropriate thing for us to commend in the Chesapeake & Ohio women. As for the apparatus, we know, from the good work done by the Johnson company elsewhere, that it must be first rate. Still, that Wolf Creek girl must be a prodigy; and as her lovely image floats before our vision it is disturbed by a picture (shown herewith) which appeared in the New York *Herald* some time ago, reproduced from an instantaneous photograph taken in the main tower at the Grand Central Station, New York City.



Rodgers' Panel-Sander.

The engravings show a new patent sandpapering machine, a wood-working machine for sandpapering raised panel work, corner and plinth blocks, ballisters, and mantel grounds. It is a machine for which every mill or factory making panel work of any description has a place. Fig. 1 presents a front view of the machine

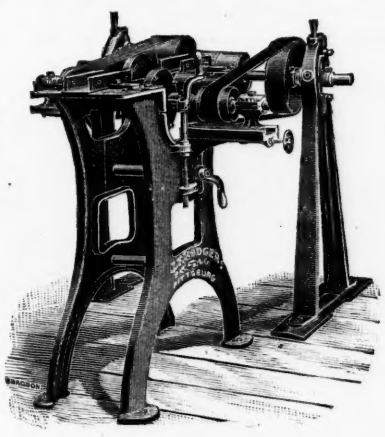


Fig. 1.

ready for operation. The spindles are journaled in suitable bearings and the latter are securely fixed to the brackets supporting the machine.

A better understanding may be had from fig. 2, which shows the machine to consist of a bed *D* and two adjustable brackets *A A'* which carry the spindles *C* and *B* in the bearings *M* and *M'*. The brackets may be adjusted vertically and the spindles longitudinally. The sandpapering heads *G G'* are alike, each being composed of a plate *H*, a block *I*, a clamping ring *J* and clamping bolts *K K*. Lateral displacement of the block is prevented by recessing the plate *H*, and the block *I* is shaped to suit the mold of the work. The head complete is shown in section under the bracket. Power is

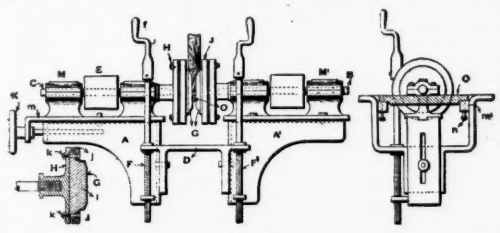


Fig. 2.

transmitted by two belts, one to each spindle. The bed is also adjustable by means of the screws operated by the handle projecting above the machine.

The work to be sandpapered is inserted between the two revolving heads *G G* which are spaced and adjusted to the size and shape of the piece. It is claimed that more and better work can be done than by the usual style of machine. Probably there is no place where such a machine is more in demand than in car shops or furniture factories where so much panel and raised work is done. The machine is made and sold by the Rodgers Machine Company, of Pittsburgh, Pa., who are prepared to furnished the machines on short notice and guarantee satisfaction with a fair trial.

Railroad Matters in Chicago.

Freight Traffic.—Adverse weather interrupted business the past week. Every road in the Western Group suffered, but the Western and Northwestern lines felt the result the most severely. The flour traffic was above the average of recent weeks, and the aggregate grain deliveries at Chicago for the week were 2,222,000 bushels compared with 3,629,000 bushels the week ending April 1, 1893, when the weather conditions were more favorable. There was also a large increase in live stock traffic. The reported injury to the small grain crops does not seem to amount to much. There was, however, a serious loss of live stock on the Northwestern ranges during the storms of the past fortnight, and the shrinkage in the cattle traffic of the lines traversing those sections is likely to be severe. It is claimed, however, that the loss of business in that direction will be largely compensated by the heavy fall of snow which it is said will insure extra pasturage in Western and Southwestern sections where the blizzards were less severe and the loss of stock small.

The outbound business from here was of very fair proportions, comparing favorably with the corresponding period last year.

The following shows the deliveries of grain (bushels) at Chicago by the leading Western railroads for the week ending March 31, and comparisons with the two preceding years:

	1894.	1893.	1892.
C. & N. West	629,000	760,000	514,000
Ill. Cent	227,000	494,000	643,000
C., R. I. & P	312,000	29,000	429,000
C., B. & Quincy	328,000	1,244,000	930,000
C. & Alton	57,000	59,000	84,000
C. E. & Ill	29,000	162,000	56,000
C., M. & St. P	317,000	472,000	538,000
Wabash	77,000	25,000	148,000
C. & G. W	103,000	280,000	194,000
A., T. & S. Fe	130,000	103,000	253,000
L., N. A. & C	7,000	1,000	1,000
Totals	2,222,000	3,629,000	3,790,000

The following shows the deliveries of grain (bushels) at Chicago by the leading Western railroads for the month of March, with comparisons for the two preceding years:

	1894.	1893.	1892.
C. & N. West	4,556,000	2,136,000	2,205,000
Ill. Cent	1,620,000	1,522,000	2,349,000
C., R. I. & P	1,784,000	313,000	2,149,000
C., B. & Q	3,032,000	4,050,000	3,154,000
C. & Alton	236,000	283,000	450,000
C. & E. Ill	167,000	338,000	247,000
C., M. & St. P	2,169,000	1,446,000	2,787,000
Wabash	509,000	165,000	359,000
C. & G. W	602,000	918,000	871,000
A., T. & S. Fe	609,000	1,001,000	899,000
L., N. A & C	15,000	2,000	2,000
Totals	15,299,000	12,210,000	15,472,000

The deliveries of flour (barrels) at Chicago by the leading Western railroads for the week ending March 31 and the corresponding time the two preceding years compare as follows:

	1894.	1893.	1892.
C. & N. W	20,777	40,300	25,763
Ill. Cent	300	900	1,545
C., R. I. & P	16,347	1,950	2,625
C., B. & Q	12,484	22,544	15,267
C. & Alton	600	900	2,525
C. & E. Ill	150	150	.....
C., M. & St. P	51,375	39,550	23,450
Wabash	450	1,970	625
C. & G. W	35,598	8,053	22,030
A., T. & S. Fe	.....	.....	605
L., N. A. & C	.....	.....	.....
Totals	138,081	116,317	94,435

The deliveries of flour (barrels) at Chicago for the month of March by the leading Western railroads for the past three years compare as follows:

	1894.	1893.	1892.
C. & N. West	86,288	186,797	139,694
Ill. Cent	3,150	5,450	4,481
C., R. I. & P	33,247	27,642	10,875
C., B. & Q	31,755	47,732	59,148
C. & Alton	4,500	3,943	12,225
C. & E. Ill	1,800	66,825	.....
C., M. & St. P	130,175	95,330	134,570
Wabash	2,250	16,256	3,150
C. & G. W	176,957	24,919	94,682
A., T. & S. Fe	.....	3,412	905
L., N. A. & C	.....	1,344	.....
Totals	470,122	479,650	459,730

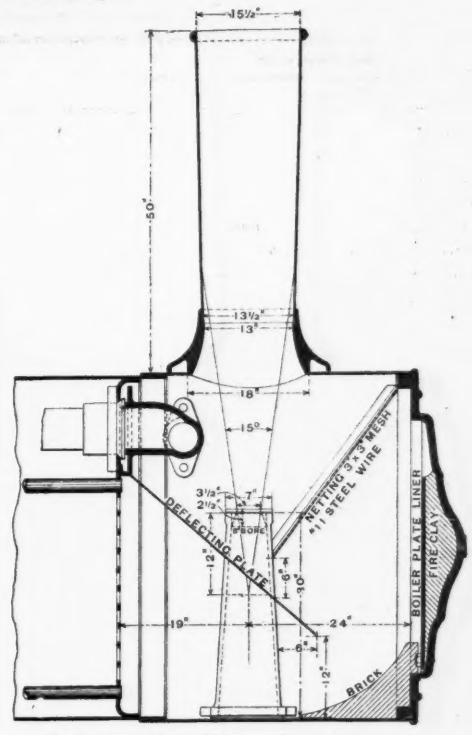
Passenger Traffic—Passenger, like freight, traffic was lessened by the severity of the weather. The roads whose lines chiefly traverse the Northwestern States were the most affected because of the shrinkage of local interior business, while those forming the Southwestern group, and especially the Illinois Central, the Chicago & Alton and Atchison, Topeka & Santa Fe, suffered the least. They were also largely compensated for any loss on interior travel by a good through travel to the Gulf and California points. The Santa Fe reported a heavy business to the latter state, and as the agreement with the Union Pacific and Northwestern for a final restoration of California rates takes effect April 15 it is expected that travel there will continue heavy up to that date.

Track Elevation—Although the Mayor and the officers of the Chicago, Rock Island & Pacific and the Lake Shore & Michigan Southern railroads have not come to a final agreement regarding conditions for the elevation of tracks south of Sixteenth street, I have it from a high officer of one of the roads that the differences between the Mayor and the railroads are now so slight that an early agreement is deemed certain, the chief contention being the question of responsibility for damage to abutting property between Sixteenth and Twenty-second streets. The Mayor contends that the railroads should pay all damages between those streets, provided the city pays on all property south of the latter street to the city limits. To this, however, the railroads object, claiming that they are not legally compelled to elevate any portion of their tracks. Meantime a lot of aldermen who are seeking re-election are making all the capital possible out of railroad-track elevation.

CHICAGO, April 2.

Standard Smoke-Box—Mexican Central Railroad.

The illustration shows the front end arrangement which has been adopted as standard on the Mexican Central Railroad for coal burning locomotives. The deflecting plate is solid and extends downward and forward at an angle of about 45 deg. to a point about 6 in. in front of the nozzle and 12 in. from the bottom of the smoke arch. The netting extends from the upper front side of the box, downward and backward to the nozzle, leaving an open space between its lower edge and the deflecting plate of 5 or 6 ins. The lower front side of the box is filled with brick so laid as to deflect the sparks and gases upward. The door is provided with a boiler plate liner, the space between door and liner being filled with fireclay.



Bell's Front End—Mexican Central Railroad.

The object of this arrangement is to throw all heavy sparks against the netting, but to provide for the smaller sparks and the gases an unobstructed passage to the stack through the opening below the edge of the netting.

The height of exhaust nozzles is regulated by the diameter of the nozzle and the diameter of the smoke-box. It is assumed that the sides of the steam jet leaving the nozzle diverge at an angle of 15 deg., and the top of the nozzle is so located as to cause the expanding steam to strike the inside of the stack just above the base, thus filling the stack and forming a good vacuum.

The device has given excellent satisfaction, the engines steaming well and throwing no sparks.

This arrangement was designed by Mr. J. Snowden Bell.

Fast Run on the Chicago & Northwestern.

The fast run on the Chicago & Northwestern from Council Bluffs to Chicago on March 23 was briefly reported in the *Railroad Gazette* last week. Taking into consideration the weight of the train (eight heavy cars), this run is one of the best long distance runs made in the West, and the following particulars have been published: The train left Council Bluffs at 9:52 a. m. and arrived in Chicago at 9:42 p. m., making the run of 488 miles in 11 hours and 52 minutes, or at the rate of 41.1 miles an hour; the actual running time being 10 hours and 42 minutes, or at the rate of 45.6 miles an hour. The fastest time over a division was from Belle Plaine to Clinton, 116 miles in 2 hours and 19 minutes, or 50.2 miles an hour. The runs over the other divisions were: Council Bluffs to Boone, 148 miles in 3 hours and 10 minutes, or 46.8 miles an hour; Boone to Belle Plaine, 86 miles in 1 hour and 55 minutes, or 45.3 miles an hour, and, Clinton to Chicago, 138 miles in 3 hours and 30 minutes, or 39.5 miles an hour. In one place 16 miles was traversed in 14 minutes, or 68.6 miles an hour.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
Published Every Friday.
At 73 Broadway, New York.

EDITORIAL ANNOUNCEMENTS

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

There is one feature in which Massachusetts has adopted the approved Western style of regulating the railroads (by prescribing definite tariffs), and that is in the transportation of milk. A special law was passed giving the railroad commissioners authority to make rates for this department of transportation, and they have just ordered a reduction in the rates on lots of less than 100 cans to Boston from points within 20 miles of that city, on the Boston & Maine, as follows:

	Less than 20 miles.	
Daily quantities.	Old tariff, per can.	New tariff, per can.
Less than 20 cans	5c.	3¾c.
Less than 30 cans	4¾c.	3⅝c.
Less than 40 cans	4½c.	3½c.
Less than 50 cans	4⅓c.	3⅜c.
Less than 75 cans	4c.	3¼c.
Less than 100 cans	3½c.	3⅛c.
One hundred cans or more	3c.	3c.

The complaint was based chiefly on the claim that shippers engaging a whole car and, doing their own loading and icing, were unduly favored. Such shippers pay $3,000 per year per car, and besides are at an expense for attendance, ice, etc. The Board estimates the total cost per car at $5,750 per year, and the rate per can is from 2.05c. to 2.29c. The petitioner pays on passenger trains an average cost of 4.33c. The petitioner's milk is carried 19 miles, that of the large contractor from 46 to 51 miles. His average is 43 cans; the contractor's is 770 cans, so that the commissioners had a somewhat complicated problem to solve. They say in the decision that they have no authority to make rates for large quantities, but only to see that those for small quantities are not unreasonable as compared with the former. A complaint of rates on the Fitchburg was dismissed.

The difficulties connected with adopting green lights for all-clear signals are discussed by a wide-awake New England Superintendent in another column of this issue. He settles them in a very summary manner, and as his experience has been such that he is peculiarly well fitted to judge of the conditions attending the use of "white" lights for signals in all of the different ways in which they have been used, his opinion should have much weight. He would simply change green from a caution to a clear signal and white from a clear to a caution. This view is not new, and some experienced signal men who are now trying to find out how good a signal they can make out of a violet light will probably be ready to adopt white for caution in case they find a lack of enthusiasm for violet. Hopeful experiments have also been made with orange and amber glasses. These colors are practically nothing more than deepened shades of what we call white lights, and they therefore afford a basis of compromise, in case compromise shall be necessary, between the advocates of white and those who deem it necessary to have three colors (besides "white"). The proposition to use uncolored glass for the caution indication, thereby leaving undisturbed, in all signals, the number and variety of colors necessary to be used, and leaving still in use three different lights which are visible at long distances, ought to receive the support of those who believe that green is the right color for all-clear, but who hesitate to make a change because they wish to use the three-position semaphore. Where much permissive blocking is done it is quite essential to the most convenient working to be able to give a caution signal on the home signal post; and a violet light is not so free from objections in that position as it would be on a distant signal post.

To use white for caution and green for all-clear would in the usual distant and three-positions semaphores be the most radical change imaginable; and some, no doubt, will object to it on the ground that enginemen would for a long time be liable to make mistakes from the force of habit. Such a radical change as adopting one whistle blast for "stop" and two for "go-ahead," in place of former practice exactly opposite, has been made successfully; but this would be more risky than that, because there often would be no hint from the surroundings, which signal to expect, as is the case when a whistle signal for brakes is given. This objection should certainly have great weight in the convention unless the majority in favor of changing were very large. The adoption of "standards" by the votes of managers who intend to go home and take no action toward adopting them, is generally farcical, at best, and in this case it would probably work positive harm. It will be better to take no action than to carry an important measure of this nature by the votes of unwilling or uninterested men.

The proposition of the New York State Railroad Commissioners to prevent the increase of grade crossings and to provide for abolishing some of those already in existence has gone the way of most of the other propositions made by that body during the past few years; it is "hung up" until all parties are agreed as to just when and how to put it in effect—which will be never. The railroads represented at the hearing in New York City last week said they had no money to spend on such improvements this year—which is true—and the Commissioners agreed to postpone action until next year; though with the percentages fixed in the proposed bill there would have been little likehood of any action on the part of the towns that would require much expenditure for a year at least. A movement of this kind progresses so slowly, at best, that every year's delay is greatly to be regretted. The most definite objection to the proposed law was that of the New York Central, that 65 per cent. was too large a proportion for the railroads to pay. But in country districts where the damages to property abutting on the street are small, a great road like the New York Central, doing a heavy through business, could not in the long run expect to get off any cheaper than that; and it would be a great benefit to have a start made in this reform, even if only the less thickly settled places secured the advantage of the proposed state appropriation. Quite likely the state will have to imitate Massachusetts more closely—that is, give the towns a more powerful lift than is now proposed—before the legislators will go for the law with a rush.

The International Railroad Congress.

The next meeting of the International Railroad Congress will take place in London in June, 1895, and we judge that this will be, to the English speaking world at least, the most interesting of the series of congresses. It ought to be, for it will be held in the country where railroads began and where they have reached their most perfect organization. The discussions will be in English as well as in French and the papers and discussions will all be printed in both languages. The Congress should therefore attract a worthy representation from all the English speaking countries, in which countries more than 60 per cent. of the total railroad mileage of the world lies, and in which railroad operation has reached its highest development in efficiency, economy and public service.

Heretofore the railroads of the United States have been scarcely represented at these congresses. The Pennsylvania Railroad is the only one of all our corporations that has a membership in the International Congress, and is the only one which has ever sent a delegate, Mr. Ely having attended the Congress held at Milan in 1887; and the United States Government has never joined, although all the other great civilized powers are members. Probably the indifference of our government and railroad companies has come about partly because the discussions have heretofore been in French, and with few exceptions none of the papers or discussions have been printed in English; partly because many of our people feel that they have little to learn about railroading from the other side of the ocean, and largely, we suppose, because of ignorance of the importance of the organization and its work. Perhaps the United States will take an interest in the next Congress and will be well represented there; we hope so, at any rate, for the railroad men who go to London may be sure that they can learn a good deal about their art, and that they will be received with a most generous and agreeable hospitality. They will lose something worth having if they miss this opportunity to know what a thoroughly good fellow the English railroad officer is in his own home.

At the risk of saying a good deal that many of our readers know, we shall attempt to give an outline of the organization and the work of the International Railroad Congress. The permanent organization is known as the International Commission of the Railroad Congress, and this organization furnishes the administrative machinery by which the congresses are set a-going and their doings recorded. Four of these congresses have been held. The first one was in Brussels in the year 1885; the next one was in Milan in 1887; the next in Paris in 1889, and the last one in St. Petersburg in 1892. The permanent headquarters of the Commission are in Brussels, where the executive work is carried on under the immediate direction of the Permanent Secretary, Mr. Louis Weissenbruch, Engineer to the Ministry of Railroads, etc., of Belgium. The Commission meets twice a year at Brussels. The Executive Committee of seven members meets more frequently, as occasion demands. The Commission is made up of 30 persons, one-third of whom are elected at each session of the Congress, together with ex-presidents of the Congress who become life members of the Commission. Not more than nine members may belong to any one nation.

The Commission not only keeps the machine going, but edits and publishes the *Bulletin*, which appears at such intervals as are necessary to publish the results of the congresses, and issues other important documents. In 1892 and 1893 the aggregate publications of the *Bulletin* amounted to 5,235 pages and these pages contain an immense mass of information on the science and art of railroading. They cover papers and discussions by many of the principal European authorities on the construction, equipment, working and management of railroads; and as the gentlemen who contribute this information wrote at leisure and for an important occasion, and with ample opportunity and authority, they have gone into their subjects in great detail, producing documents which could not be printed in the space available in a newspaper or magazine, but which are monographs or treatises on the subjects taken up.

The Congress is composed of railroad administrations, whether state or private, and of governments as such. All of the European railroads belong to it, we believe; certainly all of any importance. So do a few railroads in South America and Mexico, and many of those of the British colonies. All of the European governments are enrolled in the Congress, as are many of the British colonial governments.

The expense of membership is quite trivial. Governments as such pay what annual subscription they please, and send as many delegates as they wish. The British Government pays, we understand, $400 a year. Railroad administrations, state or private, pay an annual fixed sum of $20 plus 5 cents for every mile worked, with a maximum in case of trans-Atlantic railroads of $120. To be eligible for admission they must work at least 30 miles of line, except in the special cases of railroads like the London underground and our city elevated lines. The railroad companies belonging to the Congress are entitled to send delegates in proportion to the mileage worked, beginning with two as a minimum and going up to eight as a maximum. These delegates must be in the service of the company.

The papers presented are by reporters chosen by the Commission to report on topics assigned to them. These papers must be sent to the Commission not later than the end of next September. The reports are printed in English and French, and are distributed in type some time before the meeting of the Congress and widely circulated. They are not read at the Congress except by abstract, all of the time there being given to discussion. Written notes in discussion may be presented at the Congress.

The Congress is divided into five sections: *a*, ways and works; *b*, locomotives and rolling stock; *c*, traffic: *d*, general; *e*, light railroads, and the programme for the Fifth Congress is printed on another page of this issue.

Governments or railroad companies wishing to join the Congress may address the President of the Perma-

nent International Commission, 10 Rue Ducale, Brussels, or, if they prefer, may send their application to Mr. W. M. Acworth, 29 Abingdon street, Westminster, S. W., London, who is the Secretary of the Special Congress Committee of the Railway Companies' Association.

It will be a matter of real regret if the railroads of the United States are not largely represented at the London Congress, which is sure to be a very dignified assemblage and an important event, one well worth the attention of any of our greatest companies. It will give an opportunity to make our men and methods known abroad, and for our own railroad officers to learn much of the men and methods of other countries, and for all to help materially in the advancement of almost the most important of the industries, that of transportation.

A Raid on the Coast Survey.

There is a movement on foot in Washington which engineers should watch. We say engineers especially, but all citizens who are concerned in preserving for future usefulness one of the old and honorable institutions of the country should watch it. Its object is the destruction of the Coast Survey. This Bureau has existed for 87 years, and its work is famous among scientific men all over the civilized world. We do not say that the Bureau has always been conducted in an ideal way; it has not been free from the evils of jealousy and sloth and expensiveness, which appear from time to time, and in greater or less degree, in all government work if it endures long enough — in all human work, we might say — and which are inevitable in a country with such a shocking civil service as ours. Efforts have been repeatedly made by the spoilsmen to capture bodily the Coast Survey, and appointment therein is often influenced, if not controlled, by a "pull." This last attack is another one of the periodical raids to which all departments and bureaus of the general government are subject, and is a part of the system under which no bureau can reach anything like ideal efficiency; but generally the Coast Survey has been able to keep up a high standard, and technically its work is most admirable; even the raiders could not deny that. The records stand in charts and maps that are unexcelled and that have been of inestimable value to the nation in peace and war.

The present attack is led by Congressman Enloe, of Tennessee, and is supported, we regret to say, by the Secretaries of the Treasury and of the Navy. The motives of the Congressman are doubtless mixed, as men's motives generally are, but on his own showing in debate he thinks the spoils are not properly divided, and we have other evidence that he is influenced by discharged employees.

The attack was begun March 16 in Committee of the Whole, when Mr. Enloe offered an amendment to that part of the Sundry Civil Appropriation bill relating to the Coast and Geodetic Survey. This amendment, if adopted, would have abolished that Bureau of the Treasury Department and would have transferred the work, apparatus and records of the Hydrographic Survey to the Navy Department, and it would have made a like transfer of the Geodetic Survey to the Geological Survey of the Department of the Interior. It also provided that the Chief of the Hydrographic Survey should be an officer of the grade of Commander, and should receive the highest pay of his grade. This was an attempt to legislate a Bureau out of existence under Rule XXI, which provides that an amendment may be in order if it reduces the amount of money covered by the bill.

The amendment was declared out of order as changing existing laws, and the Congressman on March 19 introduced a bill abolishing the Coast and Geodetic Survey Bureau and embodying the same changes as were sought by his amendment in the Committee of the Whole. The sum of this attack upon the Coast Survey may be embodied in the following points: (1) That the original programme of Coast Surveys outlined in 1807 when the Bureau was organized, had been departed from and geodetic work introduced. (2) That notwithstanding millions of dollars have been appropriated, the legitimate work of the Bureau is not completed. (3) That in 1885 a minority report of a joint commission stated that the methods of the Coast Survey were "shamefully loose and even corrupt." [On an inspection of this minority report we can find no such statement. The report only says that "there seemed to be a laxity in the administration of the affairs of the Bureau."]. (4.) That he, the Congressman, had not been given free access to this report by the department in whose possession it is held. (5.) That one of the employees had carried a chronometer belonging to the Bureau when not in the field on duty. (6.) That the Chief Assistant in the office is neither a Democrat, a Republican nor a Mugwump, but any and all to suit circumstances. (7.) That "the Bureau is under a Republican chief, as are many other places that ought to be under the control of Democrats in this administration." (8.) That two Democrats of Virginia had been discharged from the Bureau for alleged incompetence (points 6, 7 and 8 were dwelt upon at great length). (9.) That men engaged in field work during the summer were permitted to work up their notes during the winter. (10.) That it takes $4 to work up field work that cost $1; that is, it takes $4 to direct the Bureau and do the office work (including working up notes, computations and drafting), while it takes only $1 to do the field work. (11). That some subordinate members of the Bureau are guilty of lobbying. (12). That promotions are usually made from the field forces. (13). That the Bureau is doing cadastral work and extending its operations as far as five miles inland, and that its surveys are minute, accurate and in great detail. (14). That a large part of the hydrographic work has been done and is being done by the Navy. (15). That Secretaries Carlisle and Herbert favor the transfer of the hydrographic work to the Navy, and the goedetic work to the Geographical Department.

Most of these reasons are too shallow and puerile to demand any attention whatever. It may be as well to say, however, that while the original organization of the Coast Survey was merely for hydrographical work, the originators of the Bureau did not contemplate any such restriction. From the first the necessity for tying the strictly coast work to geodetic work extending into the interior was recognized, and in the first quarter of this century the work of the Bureau was organized on a comprehensive and scientific basis.

We shall not take the space now to go into any recital of the history of the Coast Survey, or to attempt any development of the argument for leaving it where it is. It is enough to say that it has been at least twice transferred to the Naval Department since its first organization and re-transferred to the Interior, and that several unsuccessful efforts have been made to get it under control of the Navy. So, if anybody is going into this subject with a view to reorganization of the Bureau, he should study the history of the past and the arguments of the statesmen and of the officers of the Army and Navy that have been made for and against reorganization, in the previous discussions. He will find that it is no new or trifling question and he will find that the present organization embodies the work of a board of six officers of the Army and Navy and three civilians, and that the military and naval members of that board did not hesitate to unite in a resolution, submitted to the President, that the work should be under the control of, and considered a part of, the Treasury Department.

We have before us a communication signed by a Rear Admiral of the navy, written by him as long ago as 1857, and again endorsed by him in 1884, in which he says, "I would, if I could, put all the scientific bureaus of the government under a separate and distinct cabinet officer, to be created, but in the absence of such a new department any other change would result disadvantageously, if not disastrously, to the Coast and Geodetic Survey." He elaborates at some length the fact that in all maritime countries the work now done by our Coast Survey is not intrusted to the navies, and that in the nature of things it is impossible that work of such a severely technical and scientific character could be properly carried on by naval officers; for, however high their attainments may be, however great their ability, it is impossible for them to become masters of all arts and sciences.

The Geological Survey has its own work, which is enough to absorb all of its energies. There is no need that the two Bureaus should overlap. The Geological Survey can use the Coast Survey work where the ground is covered, and can hitch on to the Coast Survey triangulation where it is necessary to cover new ground, as it has done time and again in the past. Indeed it is a serious question if it is necessary, or even wise, that the Geological Survey should undertake geodetic work at all, although we suspect that the weight of argument would show that it would be difficult under existing conditions for that Bureau to get along without doing more or less such work; but at any rate, there is no reason why the two bureaus should conflict, and there is no reason to suppose that any money could be saved by a consolidation of the two under one head. We shall institute no comparison of the relative value of the work of these Bureaus. It is entirely uncalled for, but it is not likely that the Geological Survey would ask for a comparison to be made by competent judges.

If Congress wants to investigate the cost and quality of the work done by the Coast Survey or the Geological Survey, or both, or the cost and quality of the work done by the Hydrographic Bureau of the Navy, by all means let it do so. Probably such an investigation would be wholesome. We do not intimate for a moment that there is any reason to suppose that it should be made, but all of us do better when we know that our work is liable at any time to be overhauled by some one else. But if such an investigation is to be made let it be made by a board of men who are competent to judge of the cost and value of such work, and let it be done as a non partisan and purely public measure. Do not destroy one of the old and honored institutions of the land because an incidental Congressman says it employs Republicans and discharges Democrats. Serious and patriotic engineers would do well to keep an eye on this movement, and if it shows signs of becoming important to write to their Representatives and Senators protesting against dragging the Coast Survey into the spoilsmen's net. It is in the interest of exact science and of professional work the world over that this wanton attack upon a great scientific bureau should not succeed.

Complaining Shippers and Their Treatment in England.

The report of the English Board of Trade on its proceedings during 1893 under section 31 of the act of 1888 shows that the friction between railroads and shippers is of somewhat the same kind in Great Britain as in the United States. The powers of the Board of Trade under this act make it a conciliatory body, differing from the Railway and Canal Commission, which is a court with full judicial functions, as our Interstate Commission is not. The Board, like certain state boards in America, has no power to enforce its decisions, but acts as a concentrator of public opinion. The Secretary reports 96 cases as brought before the Board in 1893, of which 55 were based on rates alleged to be unreasonable in themselves, 8 on higher rates for shorter distances, and 24 on rates claimed to be disproportionately higher, but not on the same line. Of these 32 were settled to the satisfaction of complainants, in 19 no further communication was received and 24 were referred to the Railway Commission for the determination of the legal questions involved.

Much the greater number of complaints turned upon the rightfulness of the terminal charges collected by the railroads. Firms which had their own terminal accommodations objected to paying the charges assessed for that service. The usual reply of the companies was that they had to provide special "shunting and marshaling" (switching) services. Sometimes the claim was made that the shipper's siding occasioned more expense than if the station were used. The Board usually advised a compromise, that the charge should not be the same as for traffic on which a station terminal is properly chargeable. This compromise was acquiesced in by several companies, but refused by others, one standing firmly on its legal rights because to reach the complainant's siding the main line had to be crossed, making the switching costly and dangerous.

Distributing rates were challenged in several instances, with complaints (for example) that higher rates were charged on flour to north Wales from Chester than from Liverpool, though the Liverpool flour passed through Chester. Chester was reduced to the Liverpool rates. Higher rates were charged on milk to Waterloo when carried 57 miles than on milk brought 59 miles. The company defended the higher charge because the latter town shipped 2,120 churns per month, while the output of the nearer station was but 282 churns. When the complainant argued that the smaller shipment was *because* of the higher rate, the company agreed to reconsider. The warmest disputes were about rates on imports from foreign countries. Refiners of sugar at London and Southampton complained of undue preference because the London & South Western charged 25s. per ton from Paris to all local stations, whereas local sugar was charged according to distance. The company thereupon graded *up* its Paris rates. A horticultural firm was charged 1s. per cwt. on tomatoes and grapes from Swanley to London and 5s. to Manchester and Liverpool. The company could not understand why they objected to paying 25s. per ton on home produce when foreign produce paid £3 16s. per ton, but when the complainants began to organize a cartage service the company yielded and reduced the rate. Another sugar firm complained of the Paris rates, whereupon the London, Brighton & South Coast road raised the point that what the English refiners really wanted was "protection," and thus to increase the price of sugar to consumers for their own benefit. The Board of Trade declined to follow the matter further.

A case which reads like one of our own was the complaint against the Midland Company for discriminating between petroleum in barrels and in tanks, whereby a Yankee company, whose oil was carried in tank wagons, was getting the business. The Midland argued that barrels are in small lots, cannot be carried with other goods, and must be carted at both ends, etc. No like objection lies against wagons which carry eight tons.

Complainants replied with the same arguments used before the Interstate Commission, demanding only a fair chance to compete with the tank company. It was finally said that, while no general change in classification would be made, applications for exceptional rates on oils in casks by the carload would be considered. Conferences to solve the difficulty are still being held.

The English Board of Trade has been successful enough to show that the principle of arbitration is a good one, and that a field lies open for a good commission, even if it is not and ought not to be a judicial body. Eventually the regular courts (or a railroad court specifically appointed) must deal with the legal questions involved if no other solution is found.

The Railroad Bond Market for March.

The railroad bond market during March showed remarkable strength, with a demand from two continents. It was the feature of Wall street from the commission and investment standpoints, and at this writing is quite generally regarded as the pivot on which Wall street affairs have turned toward a more prosperous period. The following table shows the average advance of various representative bond issues:

Receivership group	Advance $3.26
Grangers	" 1.73
Trunk lines	" .98
Southwestern	" 3.94
Transcontinental	" 2.25
Coalers	" 1.07
Southern	" 1.15
Miscellaneous	" 2.14
Average advance of combined list	$2.04

The appreciation of values was more pronounced than during any similar period since the rally which immediately followed the panic. It differed from that rally in that the advance seems to possess stability and is not considered a reaction. The movement started early in the month, gaining momentum weekly. During last week the trading was in 260 issues, aggregating about 13½ million dollars, or nearly double the value of transactions during the corresponding week of last year.

The buyer has not been as discriminating as regards quality as in the past. This is greatly due to the facts that the demand for the very best class of bonds, which set in early in the year, at the time the bank surplus reserve passed all previous records, cleaned the market of floating holdings in that class of securities, and at the same time by advancing prices reduced their yield, rendering them less desirable as an investment. From the standpoint of security there is a line beyond which all bonds range equally, as they are absolutely safe. Having reached that line the investor hesitates to take a bond which pays a small rate of interest when one which yields a larger income and which is unquestionably safe, can be had for less money. It is often difficult for the investor to appreciate this truth until the cheaper bonds have risen to a figure regarded as indicative of security. However, just now, as indicated by the market, the investor is beginning to realize that there is more money and the same security in a low priced bond. Not only is the yield very much greater, but the appreciation in an advancing market amounts, in a short time, to half a year's interest. Take for example the receivership group. The average advance of the 47 issues quoted in one month was $3.26. Individual advances in some cases were as great as $10, and advances of $4 and $5 were not uncommon.

Europe's attitude as a purchaser is construed as very favorable. It has been a heavy buyer of Northern Pacific, Atchison, Missouri, Kansas & Texas junior bonds, Erie and other cheaper issues. These have been a drug in the market for some time, local capitalists refusing to take hold of them. Now that Europe has begun to buy, a fair domestic demand has sprung up. European purchases of bonds during March had the effect of lowering the rate of sterling exchange to a point which will prevent gold shipments, at one time imminent. Coming just prior to April 1, it will employ many European balances in the form of interest and dividend payments, which might otherwise have been called home. It is said by good authority that Europe has practically drained this market of certain floating issues.

The railroads have entered on a period of reorganization. These reorganizations, if plans thus far put out are any criterion, will be much more favorable to bond than stock issues. Speculators and investors are alive to this fact and are getting in almost on the ground floor. Financiers are taking advantage of this feeling, European buying and a generally improved sentiment throughout the country, to manipulate various issues with a view to making a market which will enable new reorganized issues to be the more easily handled. These are some of the reasons why the receivership issues have lead all others in the advance.

The Atchison issues, of which seven are quoted, show an average advance of over 5½ points. This was on London buying, and the outlook for the reorganization of the property. The Richmond Terminal issues reflect the favorable progress of the Drexel, Morgan & Co. reorganization plan. The Northern Pacific issues, of which five are quoted, show an average advance of 5.6 points. The basis of this advance is something of a mystery to the Street at the present time, although in a general way it can be said that it is due to London buying. All the securities except the 1sts are low, much lower than the condition of the security is believed to warrant. While

THE BOND MARKET IN MARCH.
Range for the month.

Roads in Receivers' hands.	Highest.	Lowest.	Last sale	Changes from last sale in Feb.
Atch., Topeka & S. Fe 4's	77	70⅞	76¼	+ 5¼
" " " 2ds	38½	33½	38	+ 4½
Colorado Midland 4's	32¼	28	31½	+ 3½
Atlantic & Pacific 4's	51¼	44	51¼	+ 6⅞
St. L. & S. F. gen. 4's	51½	45	51½	+ 7½
" " " 5's	81	75	81	+ 6
" " " 6's	95¾	90	95½	+ 5½
East Tennessee 5's	99	89	99	+ 10
" " ex gold	40	36	40	+ 4
Knoxville & Ohio 1sts	105	99½	105	+ 5
Erie 1st cons	135	132	131½	+ ½
" 2ds	86	81¼	81⅝	+ 2⅛
" funded 5's	82½	74	78	+ 4
Northern Pacific 1sts	114½	111	114½	+ 3¼
" 2ds	89⅜	83½	89¼	+ 6¾
" " 3ds	61	58	63¾	+ 5¼
" " 5's	34⅜	28⅝	34	+ 5½
Northern Pac & Mon. 1sts	38	31½	38	+ 7½
Wisconsin Central 1sts	76¾	73¾	76¾	+ ¾
" " incomes	17	15½	17	+ ½
Chicago & N. Pac. 5's	47⅜	45⅝	46¾	+ ⅜
Peoria, Dec. & Evans 2ds	25	23	24	+ 2
Reading 4's	78	73½	77	+ 2¾
" 1st incomes	38½	35½	37¼	+ 1¼
" 2nd "	27⅜	24¾	25¾	— 1
" 3rd "	21⅞	19	20	— ⅞
Rich. & W. P. T. 5's	24¼	21	23⅞	+ 1⅞
" " " 6's	53½	46	51¾	+ 4½
Rich. & Danville 1sts	115	111¼	115	+ 5½
" " 5's	71	67	70	+ ½
Sav. & Western 1sts	49	35	49	+ 14
Union Pacific 1sts 96	105¼	104½	104⅞	+ ¼
" " " 97	106	105	106	+ 1
" " " 98	108⅛	106	108⅛	+ 2⅛
" " " 99	108½	107¼	108½	+ 1¼
" " gold notes 6's	92	90	92	+ 1
" " sink. fund 8's	100⅛	99	100⅛	+ 1⅜
Ore. Nav. 1st. 6's	109	107⅛	108½	+ 2
" " con. 5's	73½	70	73½	+ 3½
Kan. Pac. 1st. con. 6's	97	89	97	+ 7
Ore. Short Line & U. N. con	54	52½	54	— 2
Ore. Short line 6's	92⅞	89	90¾	— ¼
Atch. Col. & Pac. 1sts	48	45	48	+ 3
U. P. D. & Gulf 1sts	47¾	44¼	46⅜	+ 2⅜
Ft. Worth & Den. City 1sts	79¾	71	78½	+ 4½
W. N. Y. & Penn. 1sts	100¾	99½	100⅝	+ ⅝
" " " " 2ds	20¾	18⅞	20½	+ ½
Average advance, 3.26				
Grangers.				
Chic. Burl. & Q. con., 5's	104½	102½	104½	+ 1
" " " " 7's	121½	120¾	121½	+ ¾
" " " " deb. 5's	101	98½	100⅛	+ 1⅝
" " " " Neb. div. 4's	91½	88½	91½	+ 3
Rock Island 6's	127	126	127	+ 1
Rock Island deb. 5's	94	92	94	+ 2
" " ex 5's	102½	99½	102⅜	+ 2½
St. Paul gold	126	123	126	+ 3
" cons. 7's	129	127¼	129	+ 2
" gen. 4's	91¾	90¼	91¾	+ 1¼
" Chi. & P. West 1st 5's	110½	108¾	110½	+ 1¾
" South Minn. div	116½	114⅜	116½	+ 2¾
Northwest S. F. 5's	112	110	111	+ ½
" " 6's	119	118	119	+ 2
" con. 7's	141	139	140½	+ 1
" 25 yr. deb	107½	105⅞	107½	+ 1⅝
" 30 yr. deb	109	107¼	109	+ 1½
" gold bonds	125	123⅛	123½	
" deb. 1933	112	110½	112	+ 3
Average advance, 1.73				
Trunk Lines.				
Pennsylvania, 4½'s	110	107	110	+ 2¾
P., C., C. & St. L. 4½'s A	104	102½	104	+ 1½
Lake Shore 1st 7's	119½	119	119¼	+ ¼
" " 2d 7's	125	123½	124½	+ ⅛
Mich. Cen. 7's	121½	122	123¾	+ 1¼
N. Y., Chic. & St. L. 4's	100½	99⅜	100½	+ 1⅛
N. Y. Central 1sts 7's	125½	124½	125	+ ⅛
Beech Creek 1sts	103½	102½	103	+ ⅛
N. Y. & Harlem 1sts	120¼	119¼	120	+ ⅜
West Shore 4's	105	103	104¾	+ 1½
Average advance, .98				
Southwestern.				
Int. & Gt. Northern 1sts	111¾	110	111½	+ 1½
Kan. & Texas 4's	82½	80	82½	+ 2½
" 2ds	47¾	42½	47¼	+ 4½
Missouri Pacific con	100	90	99	+ 10
" 3ds	109	103	109	+ 3
Iron Mountain 1sts	102¾	101	102½	+ ⅛
" 2ds	107	105	107	+ 1½
" 5's	79¾	73	79¾	+ 6¾
Pac. of Mo. 1sts	100	98	100	+ 2
" 2ds	105	104	104½	+ 2½
St. L. Southwestern 1sts	61½	55½	61½	+ 6
" 2ds	20	16½	20	+ 3⅜
Texas & Pacific 1sts	84½	76½	81½	+ 7¾
" 2ds	25½	20½	25	+ 4¼
Wabash 1sts	106½	104	105¾	+ 1½
" 2ds	75¼	70	75	+ 4½
Average advance, 3.94				
Transcontinental.				
St. Paul M. & M. Cons. 6's	122	116⅝	12[illegible]	+ 4⅜
" " " " 4½'s	100⅝	99½	100⅝	+ 1⅛
" " " Mon. con. 6's	111½	109½	111½	+ 2
" " " Mon. ex. 4's	87	86	86	+ ½
" " " Dak. ex. 6's	120	118¾	119¾	+ 3¼
Average advance, 2.25				
Coalers.				
Jersey Cent. gen. 5's	114	112½	113⅞	+ 1⅜
Lehigh & Wilk. con. assn'd	108	106	108	+ 1¼
N. Y., Ont. & W. 4's	84	82¾	84	+ 1¾
" " " con. 5's	109¼	108¾	109⅛	+ ⅝
N. Y., Sus. West. gen. 5's	91	90	91	+ 3
" " " 2nds	89	88	89	— 1
" " " funding 5's	107⅜	105½	107	+ 1
Average advance, 107				
Southern.				
Louis. & Nash. gen. 6's	116	115	116	+ 3
" " " gold 4's	76¾	75	76¾	+ ¾
" " " Kentucky Cen. 4's	84¾	84	84	
Louis. & Nash. Pen. & At. 1sts	96½	94½	95¾	+ ⅛
Average advance, 1.15.				
Miscellaneous.				
Am. Cotton Oil 8's	113⅛	112½	113⅛	+ ⅛
Am. Dock & Imps. 5's	112	111	111⅛	+ ⅛
Brook. Elevated 1sts	104	103	103⅜	— ⅜
Bur., C. R. & N. 1st	106¼	105⅛	105½	— ⅛
" " C. T. 5's	97⅞	97⅜	97⅞	+ ⅛
Ches. & Ohio 6's, 1911	119¾	117½	119¾	+ 2
" " con. 5's	106½	104	105⅞	+ 1⅝
" " gen. 4½'s	77	73	76¾	+ 2
" " R. & A. 1sts	91	87½	91	+ 3½
" " R. & A. 2ds	88	81½	88	+ 6
Cin., Del. & I. 1sts. 5's	98¾	97	98½	+ 2¾
Can. South. 1sts	110	108¾	109¾	— ⅛
" " 2ds	105¾	102¾	103¾	+ ¾
Chic. & E. Ill. gen. 5's	101½	98¾	101¼	+ 2¼
Denver & Rio Grande 4's	78	73	78	+ 4¾
Dul., S. S. & Atl. 5's	100	95	99¾	+ 6¾
Ed. Elec. Ill. 1st	105½	103	105¼	+ 2⅝

THE BOND MARKET IN MARCH.—CONTINUED.
Range for the month.

Miscellaneous.	Highest.	Lowest.	Last sale	Changes from last sale in Feb.
Eliz., Lex. & B. S. 1st	99¾	97½	99½	+ 1½
Fulton Elev. 1sts	78	77	78	+ 3
Gen. Elec. deb. 5's	85	80	83	+ 3
Hocking Val. 5's	87¾	86	86½	— 1½
" " 6's	91½	89½	90½	— 1
Hous. & Texas Cen. 1sts	107	103½	106½	+ ¾
" " 4's	66	63¾	66	+ 2¼
Iowa Cent. 1sts	93¼	88¾	93½	+ 4¾
Kanawha & Mich. 4's	77¼	74	77	+ 2
Lake Erie & West. 1st	114½	113½	113¾	+ ¼
" " 2ds	102	100	101¼	+ 1¼
Lou., N. A. & Chic. gen	68	65	68	+ 2
" " " con. 6's	100	94¾	100	+ 5
Laclede Gas 1sts	86	82¾	86	+ 3
Manhattan Ele 4's	97½	94¾	97½	+ 2¼
Met. Elevated 1sts	119¼	117¾	119	+ 1¼
Mil., L. S. & W. 1st	128½	125½	128½	+ 2
" " " Ext	108	106¾	108	+ 1¼
Mobile & Ohio gen	60	58½	59½	— ½
Mo., Kan. & East 1st	83¼	80⅜	83⅛	+ 3
Morris & Essex 1sts	141⅜	140½	141½	+ 1¼
Ohio Southern	97	91	96	+ 1¼
Oregon Improvement 5's	60	50	59½	+ 8¾
" " " 6's	100	95	100	+ 3⅛
Peo. & Eastern 1sts	78	73	77	+ 3½
Pitts. & Western 1sts	84½	83½	83½	+ ½
Rio G. West. 4's	69½	67½	69½	+ 1¼
San. An. & Ar. Pass 1sts	57½	54¼	57	+ 2¾
Tol., P. & West. 1sts	84½	80	83¼	+ 5¼
Va. Midland gen	89	80	88	+ 13
Union. Elev. 1st	97	95¾	97⅜	+ ⅜
Average advance, 2.14				

The average of the combined list is 2.04.

Erie issues have shown a substantial advance, it is conceded that they would have been stronger if there had been less opposition to the reorganization plan. Drexel, Morgan & Co. are going ahead with the plan and in a circular recently issued assure security holders that the reorganization committee is certain that it is working upon a sound basis. While Reading issues have shown a little strength, as compared with the previous month, the full advance has not been retained. This is undoubtedly due in some measure to the bad condition of the coal trade, and the possibility that the company will be forced to stand the major portion of the expense of a Philadelphia subway. The failure of H. S. Lochheim & Co., of Philadelphia, caused the various issues to weaken under forced sales by this firm.

Union Pacific issues have all made gains, which, for the most part, were slight. They are selling at rather high prices and, in the absence of any legislation regarding the extension of the Government debt, or anything definite as to the Government's attitude toward the company and its reorganization, there will probably be little or no movement.

The Granger group, while made up largely of high-class bonds, shows an average advance of 1.73. There has been good buying from the more substantial class of investors, the securities being taken from the Street. The advance is believed to reflect the general improvement in Western railroad conditions.

The Trunk Line group illustrates the statement made previously to the effect that the best class bonds, which came into demand early in the year, were comparatively neglected by March buyers.

The Southwestern group, with an advance of 3.94, reflects the very excellent showing made by Texas Pacific in its annual report, and a more confident feeling regarding Missouri Pacific. It will be remembered that the Missouri Pacific for the first time in its history rendered a very complete report of its operations for last year. The investment public received it with favor as it was believed to indicate a complete change of policy in the administration of Gould properties. The increased confidence was immediately reflected in the bonds. The consolidated issues advanced 10 per cent, touching par. This influence was reflected by Wabash, Texas Pacific and St. Louis & Southwestern. The annual reports of Missouri Pacific and Texas Pacific showed that the condition of business in the Southwest was much better than was generally expected.

The Coal group, owing to the classification of Reading and Erie in the receivership groups, quotes only the more substantial issues. The average advance was 1.07. The coal trade, on which these roads are largely dependent for the revenue, is in a very bad shape owing to the open winters, business stagnation and the approach of spring, which has necessitated making very low prices for the product. Were the stocks not so strongly held they would have reflected this condition. The bonds are even more remotely removed from influences of this nature, being regarded almost entirely as investment issues. It is not to be expected that they will show any weakness while the stocks remain firm. The advance which took place was upon investment buying by interests which for years have been led to look upon the coal stocks as monuments of stability.

In the Miscellaneous group the various industrials show well, as do also the railroad issues not classified elsewhere. The weak spots were in Brooklyn and Union Elevated, which were somewhat heavy on poor earnings. Chesapeake & Ohio has enjoyed an exceptionally good foreign demand. Hocking Valley issues have been weak on the bond issue to be made, and the rather unfavorable report for the year.

The market for the last week was the strongest in

March. In two hours on Saturday the total amount traded in was $1,740,000. It was the largest two hours business since the Saturday half-holiday started about six years ago.

The Austrian Government Railroad Inspectors, commenting on a derailment due to the breaking of a rail, have called the attention of the railroad companies to the fact that rails made from the same charge of a Bessemer converter, or even from the same ingot, do not always have precisely the same qualities. They think it desirable that whenever a rail breaks, 30 to 50 rails of the same converter charge be taken from the main track where fast trains pass over them, and subjected to severe observation in suitable station tracks, which will be possible only if each rail is marked with a number indicating the charge from which it was rolled. In consequence of the longer duration of the converting process, Martin steel, they say, shows greater uniformity and reliability, and preference should be given to it for tracks on which fast trains run and on steep grades. Further, the inspectors recommend that a substantial reward be offered for the discovery of dangerous fractures not only in rails, but in tires, and for loose tires, etc.—a practice which the state railroads and several private railroads have long ago adopted. The amount of these prizes on the state railroads is: For discovering a loose tire or wheel, or broken or cracked tire of locomotive, tender or car, $4.80 on a fast train, $2.40 on ordinary passenger, mixed and local trains; and for a broken rail, 80 cents. When these defects are found in rolling stock under repairs, rewards are paid also.

The California tramps under "General" Fry, who came East through Texas, had got as far as St. Louis on Tuesday last, and crossed the river into Illinois near there. There were about 700 of them and they boasted that they would reach Washington ahead of Coxey's band of 100 or 200 who started in Ohio and who were at or near Pittsburgh at last accounts. Other "armies" are announced as being formed at Denver and San Francisco. Fry's band produced considerable excitement in Texas. Governor Hogg accused the Southern Pacific Railroad of wilfully burdening the State with their support and demanded that the road take care of them, but General Manager Kruttschnitt vigorously denied the Governor's statements and said that most of the army was made up of ordinary railroad tramps. The road has taken all reasonable measures to keep the vagrants off the cars. The gang seems to have got pretty short of rations at Finlay, but some charitable contributions finally came to their relief. Some of the way the tramps rode in passenger cars, a train having been paid for by a subscription taken up in one of the cities. From Texas to St. Louis they evidently found empty freight cars in plenty.

A statement recently issued of the railroad lines opened in Russia in the months of November and December alone made a total of 959 miles, 385 miles being in a single line between Riasan and Kasan, which is nearly parallel with the upper course of the Volga, beginning about 200 miles southeast of Moscow, and extending east by north. Kasan, which is not quite reached yet, is at the point when the Volga turns from its east by south course nearly at right angles, to flow thence south by west to the Caspian. There is a parallel railroad more than 100 miles farther north. Another long line is 165 miles of the road heretofore mentioned along the northern base of the Caucasus to the Caspian at Petrovsk, which was opened Nov. 18. There would seem to be plenty of room for more. With their present freight rates even these distant lines will be able to carry grain for export, and therefore compete directly with our Kansas, Dakota and Washington lines.

NEW PUBLICATIONS.

Electrical Engineering, an illustrated monthly magazine which made its first appearance in January, 1893, has recently changed, to some extent, the scope of its work. The editorial staff has been increased, Mr. Wilbur M. Stine, of the Armour Institute, having accepted the position of editor, and Messrs. L. L. Summers and J. C. McMynn appearing as associate editors. The number of contributors has also been largely increased. The monthly summary of current engineering literature, which had become so important a feature of the magazine, is now published separately under the title of *Electrical Literature*. This is a convenient and useful index, the leaves being printed on one side only, and with but one subject on a page, the references up to date, and dealing not only with electrical matters, but with other branches of engineering. The arrangement is such as to facilitate the separation of the leaves, and their filing by the card catalogue or other system. Mr Fred. De Land, The Rookery, Chicago, still controls both publications.

The Art of Coppersmithing. A Practical Treatise on Working Sheet Copper into all Forms. By John Fuller, Sr. Pages 327, large octavo; index, and nearly 500 illustrations. New York: David Williams, 1894. Price, $3.

The kind and intelligent face of the author is a fit frontispiece for this admirable book, which was suggested by a wish to help others, and has been written with abundant knowledge and a clear head. In his preface Mr. Fuller tells us that he began as a boy of nine to learn the trade of what was then called a tinman and brazier, and that he encountered many stumbling blocks and had to overcome many obstacles, and found few sources of information beyond the shop. Although he searched far and wide, he found no written guide to the coppersmith's trade, and he then resolved that when the time came he would publish his experience for the benefit of other boys. Finally, many years later, he was able to carry out this resolution by writing a series of articles for *The Metal Worker* which are now collected and reprinted in this volume. He says that he wrote these articles with an imaginary boy at his side. Almost anybody can set out to write in that way, but it requires not only the wish and the imagination, but the gift of sympathy, to keep up such a fiction and to always write up to it. Mr. Fuller appears to have succeeded thoroughly. His book is singularly simple and clear, and yet very minute in detail. He treats of the making and repairing of copper articles, from the humblest household utensils up to railroad and marine work and coppers for dyeing, distilling and brewing.

Corrosion of Pipes and Telephone Cables Due to Electrolytic Action.

Since the introduction of the trolley electric system, considerable has been said and written concerning the subject of corrosion of pipes, etc., by the return current

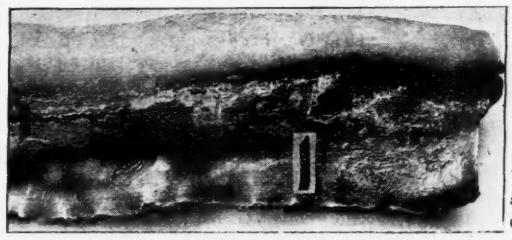


Fig. 1.

of electricity used in operating the roads. The subject is a very serious one, when you consider the extent of damage done the water pipes, gas pipes and telephone cables by electrolytic action. The trouble lies in inability of the return circuit to carry back to the dynamo the current discharged through the car wheels. There are several systems used in operating trolleys, the most prominent of which is the single trolley system, where but one overhead wire is used for each track. More than 75 per cent. of the roads operated in this way use the overhead wire for carrying the positive or outgoing current; but Mr. J. H. Vail, who is an authority on such subjects, in a paper read before the annual convention of the National Electric Light Association in Washington, D. C, last month says: "The track system of all

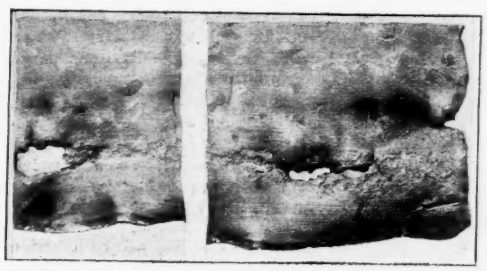


Fig. 2.

electric railways should really be the positive side or outgoing circuit. It will be readily understood that as the current travels from positive to negative, therefore any arc which occurs between the trolley wheel and the trolley wire will carry metal from the trolley wheel and deposit it on the trolley wire. If the reverse method of connection is made, the trolley wire will lose the metal which will be deposited on the trolley wheel, and in time the strength and conductivity of the wire must be seriously impaired, eventually resulting in breakages." Some time ago a road in Boston changed from the former to the latter system for experimental pur-

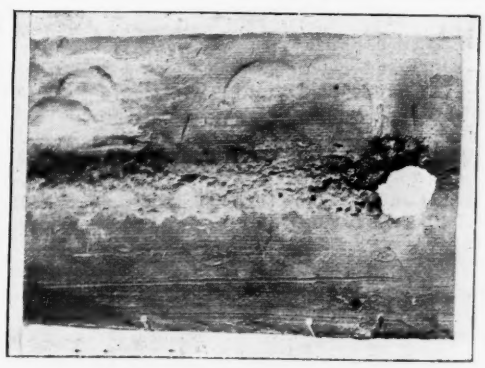


Fig. 3.

poses, finally deciding in favor of the overhead wire for the positive current. One year was devoted to each system.

In the positive overhead wire system the rails should act as a continuous conductor for carrying the discharged electricity back to the dynamo; but they fail, owing to improper connections at the rail joints. Leakages occur at these points even when a very heavy copper bond is used. Earth, especially when it becomes damp, acts as a conductor; consequently, when a leakage occurs at a rail joint, the electric current immediately takes to the ground, and the earth in the vicinity

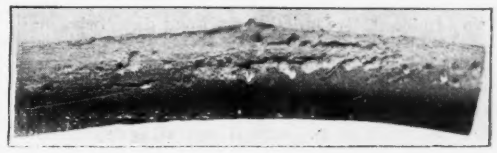


Fig. 5.

becomes charged with the current which was designed for the rails, and plays to a considerable extent the part of a return wire. Iron or lead pipes (which are better conductors than the earth) extending along the route below the surface, become charged. This condition involves a discharge at some point, and here the electrolytic action is established, which, little by little, carries away the metal, or rather converts it into a compound which, in the moist earth, is readily detached. When this action is confined to a limited area, as at an abrupt bend in the pipes, the corrosion is rapid; but when it is distributed along a stretch of several hundred feet the destructive action is slower, but nevertheless constant and sure. Of course in some places electrolysis is more rapid than in others, owing to difference in the chemical composition of the earth. Several plans for correcting this evil have been tried, the best results so far obtained being from electrically welding the rails in sections of about two thousand feet. Rails of a new line soon to be constructed in the southern part of Brooklyn, N. Y., will be laid on this plan.

To show the extent of damage done to underground

Fig. 7.

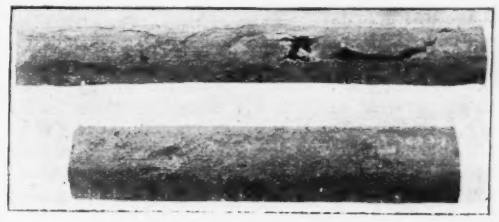


Fig. 8.

mains and cables we reproduce some photographs of pieces of telephone cables and gas and water pipes which have suffered from electrolytic action. These were removed from various sections of Brooklyn under the direction of the Board of Electric Subways of that city.

No. 1 is the lead covering of a telephone cable No. 106, which lay in a conduit leading from a manhole to a pole at the corner of Court street and Fourth place. The cable rested in pitch at the bottom of the duct, and was attacked through the same. This fact contradicts the claim of some electricians that pitch will act as an insulator.

No. 2 represents another section of this cable (No. 106) removed from a conduit between First place and Fourth place. Another portion of this same cable is shown in No. 3.

No. 5 illustrates part of cable No. 49 which was located

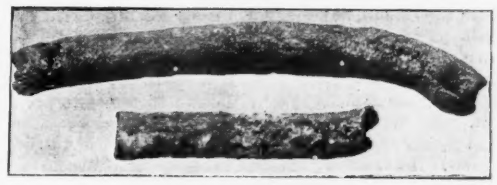


Fig. 9.

in a conduit under the rails of the Fifth avenue trolley line at Flatbush and Fifth avenues. This cable was also badly eaten near Bergen street.

No. 7 is part of an iron water pipe which had been in the ground under a trolley track at Second avenue and Fifty-second street. This represents a portion of a private main, and was in use about one year.

No. 8 shows another iron pipe used to replace No. 7 which had been destroyed by corrosion. The indentation and perforation which may be seen near the left-hand end of the pipe were produced in *thirty days*, notwithstanding the fact that No. 8 was a much heavier pipe than No. 7.

No. 9 represents two parts of a lead water pipe removed from four feet below the surface on Second avenue, between Fifty-fourth and Fifty-fifth streets. This was in use four years.

These nine photographic reproductions which we have shown clearly illustrate the necessity of a continuous circuit for the return trolley current. Although these specimens represent pretty severe usage of pipes and cables, the experience of Brooklyn does not differ materially in this respect from other cities such as Boston, Philadelphia and Milwaukee. The officials of the

various trolley roads are awaiting a remedy for this evil, as it costs them considerable each year to replace pipes, etc, damaged by currents from their respective systems. They acknowledge the harm done by their lines, and readily pay all bills in reference to such cases.

Foreign Railroad Notes.

The organization of the Prussian State Railroad management is about to be changed. There have been two administrative units, the railroad directories having charge of the operation of 1,500 to 2,500 miles each, and the operating bureaus with 100 to 200 miles, reporting to the directories, but with some independent authority and initiative. Each of these bodies consists of a staff of experts in the several operating departments. The operating bureaus are to be dissolved, and the officers who take their places will take orders directly from the directories to which they report, which thus will become directly responsible for the entire working of the lines in their charge; and the extent of railroad subject to a single directory will be reduced.

It is popularly supposed that cars are meant for carrying freight; a little observation shows that actually their chief use is for storehouses, and this fact appears in Europe as well as in America. And this not only in the hands of the negligent consignee, who takes his own time to unload, but also in that of the presumably careful carrier, who keeps his cars standing on sidings several times as many hours as he keeps them moving. Some one has pointed out that the elaborate freight statistics of the Prussian State Railroads recently published showed that the average mileage of freight cars in the last year was only 10,347 miles. Assuming, says he, that the average speed of freight trains is 18.6 miles (pretty fast for freight) per hour, the cars were moving only 555 hours or 23 days in the year, and therefore stood still at stations 342 days. He estimates that the average number of runs per car was 150; the statistics show that 51 of these were made without load, leaving 99 runs when the car was loaded and unloaded. The legal allowance of time for these operations is 16 hours each, equal to 66 days for the 99 runs. For switching three hours, he thinks, ought to have been enough, the running time being little more than six; this would require 19 days more. This accounts for 108 days of the car's time; what on earth was it doing on the other 257 days? And why should there be a car famine every year? After all, he has little to suggest as a remedy, except that freight trains ought to be run at night and be loaded and unloaded by day—apparently not considering that, to get through, many must run night and day.

In adopting the metrical system, the Germans at first provided for no unit between the kilogram (2.2 lbs.) and the ton (2 204 lbs.). They had been accustomed, however, to a unit of 100 of their pounds, called a "centner," and a "metrical centner" of 50 kilograms was adopted, or 110 lbs. This, however, broke into the decimal character of the system, and the use of the centner was gradually abandoned, while the expression "double centner" was employed by many, which is 100 kilograms or 220 lbs., and has become common for goods in casks or sacks and for quotations of prices for hardware and structural iron and even for coal. It is now proposed to make this a legal unit to be designated by a capital "D."

The hectoliter as a liquid measure was readily accepted in Germany, but the meter, as a measure of length, though used by ladies for cloth, etc., long before it was officially adopted (probably coming from Paris with the fashions), has not been so generally accepted. It is complained that it is too big and the centimeter (0.4 in.) too small, and feet and inches are often used in court proceedings and in police directions. German town authorities will still order that ponds may not be open to skaters until the ice is 5 in. thick, instead of saying 12½ centimeters; still the meter tends to prevail. The measures of area, the are and the hectare, are very slow to be comprehended by the conservative farmer. He must pay his land taxes by these measures, but to understand what they are he painfully converts them into rates per rood and "morgen." The hectare (2.47 acres) is found too large, and the are (3.95 sq. rods) is much more used, but seeding, crops and prices are generally reckoned by the ancestral measures.

The Germans never adopted many of the names of units in the French decimal system. Logically, by that system, the "double centner" would be a "dekamyriagram," which would kill it in its infancy. It might also be called a "hektakilogram," which is, perhaps, not so bad, but certainly would not be used by any but a born Greek. "Steres," "decisteres" and "decasteres" have never been known in Germany, where they say "cubic meter," etc.

The railroads opened during the year 1893 in the entire German Empire in the aggregate amount to something more than 404 miles, against about 500 miles in 1892 and 310 in 1891. Nearly all the additions last year were short branches, the longest being less than 50 miles.

Few appreciate the importance of Berlin as a port. The rivers and canals, it is true, are navigable only by small vessels; but they wind about the city in such a way that few parts of it are far from a landing. In 1893 there were 45,762 arrivals and 45,359 departures of these craft in Berlin, which landed 4,921,233 tons of freight there and carried away 582,332; while 4,359 craft, carrying 421,836 tons, passed through the city. Among the arrivals were 3,504 of passenger steamers, 4,304 of tugs towing other craft, 612 of freight steamers and 37,312 of sailing craft, the latter with an average capacity of 149 tons. Stone, sugar and lignite are among the principal freights.

Feb. 9 and 10 trials of the Heilmann electric locomotive were made on 15 miles of the French Northern Railroad out of Havre, a section having grades as steep as 42 ft. per mile, and curves of 3,924 ft. radius. Eight trips were made, two in 24 minutes, two in 25, one in 26, one in 27, and two in 55 minutes, the fastest at the rate of 37½ miles per hour.

TECHNICAL.

Manufacturing and Business.

The Massillon Bridge Works will resume operations this week, employing about 100 men.

The office of Robert Barry, the New York representative of the Otis Steel Co., Limited, of Cleveland, O., has been removed from the Mills Building to 115 Broadway, New York City.

Lucien Barnes, of Syracuse, N. Y., has invented one more car coupler, and with Charles Barnes has organized a company called the "Barnes No. 4 Car Coupler Co." to manufacture the new coupler.

The bridge and construction department of the Pennsylvania Steel Co. has work enough ahead for a month. The output from every department has increased and shipments have been heavier for the past two weeks than for the last sixth months.

The firm of Bell & Co. has been formed with offices at 908 Betz Building, Philadelphia, as commission merchants in iron, steel pipe and railroad supplies. The firm is composed of William G. Bell, who was for nearly 22 years with the late Howard W. Middleton, and Thomas M. Bell, formerly Vice-President of the National Railway Spring Co.

The E. W. Bliss Co., of Brooklyn, N. Y., is now erecting at its works two of the largest and heaviest presses which the firm makes, No. 14 and No. 15 toggle drawing presses. The No. 15 press weighs about 140,000 lbs. and is driven by an engine attached to it. It is about 14½ ft. in height and has a width between the uprights of 54 in. and will draw articles up to 11 in. in depth. It can be started or stopped at any point in the stroke by means of a friction clutch. These presses are used in drawing up such articles as kitchen boiler heads, cylinders, steel sinks, heavy black iron and enameled ware. The No. 15 press will be shipped in about a week to England, to be used in drawing up heavy steel shells. The No. 14 press is somewhat lighter, weighing about 75,000 lbs., having a distance between the uprights of 30 in. and will draw articles in depth up to 10½ and 12½ in. This press, while it will draw articles of greater depth, has not the requirements for doing nearly as heavy work as the No. 15 press. This press is being built for a large tinware stamping concern for drawing up heavy enameled ironware of various descriptions. Besides these orders, a large number of smaller machines are in process of erection, and the company reports that inquiries for new tools from manufacturers who are increasing their capacity have been very frequent lately and give assurance of better times not very far ahead.

New Stations and Shops.

The Delaware, Susquehanna & Schuylkill will build a 27-stall roundhouse at Drifton, Pa., instead of at Roar, as decided last year.

The Citizens' Committee at Lafayette, Ind., has made an agreement with the officers of the Louisville, New Albany & Chicago by which the subsidy of $175,000 voted by the town of Lafayette to secure the building of the shops of the company at Lafayette will be made immediately available to the railroad company.

Iron and Steel.

President A. J. Moxham and Vice-President T. L. Johnson, of Cleveland, announce that it has been definitely decided that the new works of the Johnson Steel Co. will be located at Lorain, about 30 miles west of Cleveland. The location is to be on the Black River, about two miles from the town, and it is said that work on the new buildings will begin as soon as the title to the land is transferred to the company. There is only one point remaining to be decided. The company asks the town of Lorain to condemn sufficient property along the river front to widen the channel of the river to 400 ft. for a distance of four miles from the harbor, the work to be done in 20 years.

The Indiana Steel Co. has been organized by Pittsburg and Chicago capitalists to build a plant at Frankton, near Ellwood, Ind. The plant, it is claimed, will be in operation in June, and will include the manufacture of car axles and other railroad material.

The Chamber of Commerce, of Tacoma, Wash., is endeavoring to raise $35,000 as a subsidy to secure the removal of the rolling mills now at Burlington, Ia., to Tacoma. These rolling mills are owned by the Holcomb-Brown Iron Co., but have not been in operation for the last eight months. Richard Brown is President of the company and H. G. Hamilton, of Youngstown, O., is Superintendent, and these officers have stated to the Tacoma committee that the new buildings at Tacoma will be commenced as soon as the subsidy mentioned is subscribed.

The Elko Paints.

These paints are a mixture of raw or boiled linseed oil with a mineral found at Randolph, Catteraugus County, N. Y. The mineral is a double silicate of aluminum containing appreciable quantities of manganese, iron and plumbago, and the manufacture of the paint consists simply of the crushing, grinding and bolting of this mineral and the introduction of suitable coloring matter, and the thorough mixing of these pigments with linseed oil. The mine at Randolph furnishes three samples or specimens, which are the same in texture, all being soft and unctious, but different colors, one being green, another red, and the third yellow. These when mixed with oil give three different colors of paint. The valuable feature claimed for this mineral is that it has an affinity for linseed oil, either raw or boiled, and that when thoroughly mixed it will not separate and settle to the bottom of the paint pail; that it is insoluble in water, and does not therefore wash out or dissolve when subject to weathering; that it is elastic when dry and does not crack or scale off when exposed to the extremes of heat and cold. The paint is entirely new, and the company in introducing it offers every opportunity to their patrons to satisfy themselves of its good qualities. The features specially claimed for the paint are that it is durable, elastic, fire and water proof; that its colors are permanent and that the linseed oil has a special affinity for the mineral combining with it to form a uniform and homogenious substance. The company manufactures a special paint from this mineral for a wood filler for interior work, or as a rough stuff for carriage and car body filling. As a base for rough stuff it is said to contain the proper amount of grit to rub well and to produce a surface which is non-porous, tough, elastic and non-absorbent, possessing at the same time a degree of smoothness and density usually unattained. The company has offices in College Place, New York, and the men interested are the Hon. C. P. Vedder, President; J. E. Hazard, Vice-President and General Manager, and DeWitt C. Wheeler, General Agent.

An English Automatic Audible Signal Apparatus. One of Timmis & Abernethy's visual and audible permanent recording fog signal machines is now in use on the Tottenham & Forest Gate Railroad, near the Hoe Street Station of the Great Eastern Railway, London. With this apparatus a signal is given on the engine, an indicator pointing to "line clear" or to "danger," and one of two bells being rung in the cab. This audible signal is repeated to the signal cabin, assuring the signalman that the engineman has received the signal. The connection between the locomotive and the roadside apparatus is made by means of a large brush sweeping over a fixed contact placed between the rails.

New Lighthouse at Chicago.

The contractors have commenced active work in raising the lighthouse on the four-mile crib at Chicago. The lighthouse is similar to the one now surmounting the two-mile crib, and will be of steel about 80 ft. in height. It is expected the work will be completed within a month. It is proposed to ring a fog bell by means of a storage battery which will be charged at one of the city electrical plants.

The National Switch and Signal Company.

This company has on exhibition at its Chicago office, Room 1236 Monadnock Building, a complete interlocking and signaling apparatus. The locking frame on exhibition is arranged to show the locking for 10 levers controlling a double-track junction, a siding and a cross-over, and the operation of five switches and nine signals. A derailing switch detector bar, lock, pipe bolt-lock, home signal, distant signal and automatic torpedo signal are connected to and worked from the machine in the same manner as in practical work. The home signal is worked by pipe connection, with lazy jack compensator, and the distant signal by two lines of wire, adjusted by the Mitchell & Stevens compensator.

The block system is shown by a track of full sized rails, divided into four sections. The signals are standard semaphores, two being operated by the Lattig automatic electric apparatus. The third is a manual signal operated from the interlocking machine, and controlled through the usual track circuit. One signal is equipped with the Koyl parabolic illuminated blade and lamp.

The exhibit is made for the purpose of furnishing an opportunity for all persons interested in the art to make a thorough examination of the several parts as manufactured by this company.

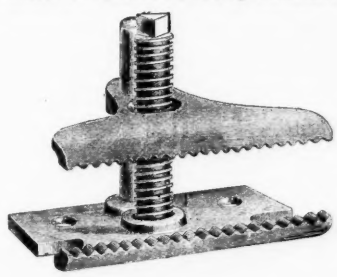
This company is preparing to equip the Metropolitan Elevated Railroad of Chicago with the several appliances exhibited, and will commence erecting the apparatus about April 10.

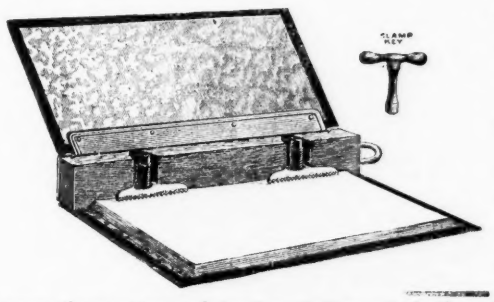
Accumulators in Street Railroad Service in Paris. According to the *Western Electrician*, Paris now has the largest installation in existence for the operation of street cars by means of storage batteries or accumulators. A line between the Madeleine and St. Denis has been so operated for about a year and now has 25 cars in service. The cars are mounted on four wheels, with a series-wound bi-polar double reduction motor of the Manchester type on each axle. Each motor is capable of exerting about 10 H. P. at 1,350 revolutions per minute with a potential of 200 volts, and with an efficiency of about 73 per cent. The accumulators used are

of the chloride type, weighing about 38 lbs., and are placed under the seats of the cars. Each car carries 108 elements or cells divided into 12 groups, each group of nine cells in a wooden box and connected in series. Spring contacts are so placed on the motor circuits that as each group is introduced it is automatically placed in circuit by the pressure of the contact spring upon brass strips on the box to which the terminals of the group are connected. The batteries are arranged in series in four divisions of 27 elements, each division thus producing an electromotive force of about 50 volts. The four divisions may be run in parallel or, by means of switches under the control of the motorman, the four divisions may be reduced to two each of 54 elements in series, and these two divisions run in parallel. In case a higher speed is required, all elements can be placed in series by the motorman, thus raising the electromotive force to about 200 volts. The batteries are charged from three dynamos each driven by a 125 H. P. Corliss engine. The groups of accumulators are charged in parallel with an electromotive force of 260 volts, and are left in circuit until they have absorbed about 20 per cent. more current than will be required of them in service. The duration of the charge is usually about six hours for a battery from which its full service will be required. The efficiency of the battery is said to be as high as 70 per cent. It is reported that the equipment of the road is to be increased to 90 cars.

The Philadelphia Binder.

A good device for holding large maps and drawings is a thing that every engineer and architect wants; that is, a means of securely fastening large sheets of various sizes in such a manner that any one of them may be quickly removed and replaced without disarranging the rest or damaging the sheets. The Rush & Gildemeyer Manufacturing Company, of Philadelphia, has introduced a binder, illustrated herewith, which requires no holes to be punched, and by which sheets of drawing





paper, tissue paper and tracing cloth may be held one with the other and in all sizes. The binders have had several years of experimental use in The Real Estate Title, Insurance & Trust Company's offices, and are still in use there. The engravings show clearly what the binder is and how the sheets are fastened—their edges being pressed between two steel or malleable iron clamps by a binding screw turned with a key. The back is of oak, to which the clamps and hinged sides are securely fastened.

A Mechanical Whitewasher.

Master Mechanic F. B. Griffith, of the Delaware, Lackawanna & Western road, has adapted to whitewashing the method used at the World's Fair for painting the buildings. He has fitted up a freight car with two reservoirs and three ordinary air pumps. Steam is taken from the locomotive or any stationary boiler conveniently at hand by ordinary couplings. The air is conveyed from these reservoirs through piping or hose to the operator, who sprays the lime over the building to be whitewashed. To each nozzle are attached two lines of hose, one carrying the whitewash and the other the air, and the flow of each is regulated by valves. The nozzles may be attached at the end of a long arm, enabling the operator to reach heights inaccessible to the brush, except by scaffolding.

North River Dock Improvements.

At a recent meeting of the Sinking Fund Commissioners the scheme for the improvement of the North River water front from Charles to West Twenty-third street was taken up, and upon the declaration of the City Chamberlain and the President of the Dock Board that the improvement was necessary and should be done at once, the plans of improvement of the water front from West Eleventh street to Gansevort street and from Charles to West Twenty-third street were adopted. These plans have been described in the *Railroad Gazette* of 1893, pages 428, 895 and 933. The cost of these improvements has been estimated at from $11,000,000 to $20,000,000, but the expense is to be met by a regular annual allowance of $3,000,000. The work may commence at once, for the money is in hand.

The Hassell Perfected Railway Signal Co.

In announcing the organization of this company we gave the name of one of the incorporators as Mr. T. J. Oakley. We should have said Mr. T. J. Oakley Rhinelander, of New York, who is a well-known citizen of wealth and standing. The President, Mr. Bentley D. Hassell, states that the system of signaling which the company will introduce, while adapted both to single and double track roads, has been especially devised for use on the former, and can be operated either by circuits or track instruments. The company is constructing two full-size sets of apparatus which will soon be ready for inspection.

Rights to Van Dorston Coupler Patents.

On March 29, 1894, A. W. Van Dorston and the Van Dorston Railway Supply Co. "dedicated" their improved contour lines and tail-end drawbar connections to the M. C. B. Association by a license and agreement covering certain claims in reference thereto.

The Air-Brake Suits.

At a hearing had March 29 in the United States Circuit Court, at Baltimore, an order was granted permitting the Boyden Brake Company to take testimony relative to a prior patent. The patent which the Boyden Company is charged with infringing is dated March 29, 1887, and the object of this new testimony is to show that the said patent in suit is *not* the pioneer patent for producing consecutive quick-action of automatic air-brakes.

THE SCRAP HEAP.

Notes.

It is reported from Indianapolis that the Cleveland, Cincinnati, Chicago & St. Louis has discharged 10 passenger car conductors, presumably on account of dishonesty.

A request from the New York, Lake Erie & Western to be relieved for this year only from the operation of the automatic coupler and brake law has been granted by the New York State Railroad Commissioners.

John D. May, the train robber, who killed a fireman in Texas some time ago, has been sentenced to to be hanged. Charles Mork, who tried to derail a train, has been sentenced to one year's imprisonment at Waukegan, Ill.

The question of wagers on the Union Pacific and the Receivers' order reducing the pay of enginemen and other trainmen were up before the Court at Omaha last week, but no definite results are yet reported. The press reports seem to be colored.

The passenger station at Burmont, Pa., on the Philadelphia, Wilmington & Baltimore, was lately closed by the health officers on account of the presence of scarlet fever in the family of the station agent. A temporary building was erected for the sale of tickets.

A considerable number of track repair men on the Philadelphia, Wilmington & Baltimore have struck because their pay has been reduced from 12½ cents an hour to 10. They have been working eight hours a day, and were ordered to work ten hours for the same amount per day.

Press dispatches report that seven men were killed by the fall of a bridge near West Radford, Va., on March 30. The bridge was being taken down to make way for a new one, and some temporary braces were displaced by the accidental fall of a piece of timber. Eight men fell about 90 ft.

The city of Pittsburgh has just discontinued the work on Highland and Schenley parks which was begun in the winter for the purpose of relieving destitute unemployed men. The Allegheny Valley and the Baltimore & Ohio have run daily free trains to and from the parks to carry these men, and it is estimated that the number of trips made by them is 291,200, which at an average mileage of five miles, makes nearly a million and a half passenger miles which the railroads have furnished for nothing.

The employees of the Cincinnatti, New Orleans & Texas Pacific and the Louisville Southern have been notified of a reduction of 10 per cent. in wages, taking effect April 1. The Receiver of the Mobile & Birmingham has notified employees of a reduction of wages to take effect May 1. Enginemen, trainmen and shopmen are reduced 10 per cent.; most other classes 5 per cent. The Wabash has announced a reduction in the wages of conductors, brakemen, enginemen and firemen, to take effect May 1. The Pennsylvania Railroad has laid off considerable numbers of brakemen and has reduced a good many firemen to brakemen.

South American Notes

The block system is to be introduced on the Buenos Ayres section of the Central Argentine Railroad.

The Corporation of Concordia, Province of Entre Rios, Argentine, is considering plans submitted by Mr. Oliver Budge for lighting that city by electricity.

The official estimate of the railroad guarantees to which the ten guaranteed lines of Argentine are entitled for the year 1892 amounts to $4,964,959.

The Department of Public Works of Argentine will invite tenders for the construction of a new iron bridge over the Riachuelo, in place of a wooden one. The cost of the new bridge it is estimated should not exceed $260,000 gold.

Peter A. Gartland & Co., have petitioned the municipality of Buenos Ayres for a charter to construct and operate an extensive system of tramways, partly surface and partly subterranean, in that city. The motive power to be used is not stated except that it is proposed not to use animal traction.

M. Bartissol's plan for a utilization of those portions of the Panama Canal which have been excavated by turning them into harbors seemed sensible. It was to some extent a redemption of the Panama folly. Now comes the news that M. Bartissol, evidently losing sight of the advantages of his original plan, wishes to organize a company to complete the canal by boring a tunnel six miles long through the mountains.

The Buenos Ayres *Herald*, commenting on the large mileage (1,398 miles) of the Buenos Ayres Great Southern Ry., says: "Doubtless prudence will suggest a pause in this pushing until the new lines have had time to get their earning capacity well started, but then another advance must be made if this great company would live up to its opportunities. It must go on to Patagones and perhaps to Chubut, surely along the Rio Negro to the western boundaries of the Republic, and there connect with a Chilian line to the Pacific. If it should fail to do these things it must be prepared to meet a competition which will cost more than these extensions."

Col. Howard Vincent, C. B., M. P., who has lately made an extended tour through South America in the interests of British trade relations with the Spanish-American countries, writes to *The Ironmonger* a letter concerning iron and steel in that part of the world, in which he says: "The locomotives and carriages upon the earlier lines were mostly English. Soon a change set in. There was a growing demand for carriages of the long American bogie type. Some were obtained from England; but, so far as I have been able to gather from railroad managers, they are not so satisfactory from many points of view as the American make—not as convenient in their internal arrangements, not so attractive in decoration, and with a tendency to become 'hunchbacked.' The United States have become formidable competitors in this direction, though less with regard to trucks." Again, he quotes another writer concerning locomotives: "The Americans build them with their mechanical parts exposed, so that should anything go wrong the damage can be repaired by a comparatively inexperienced man. An English locomotive, on the other hand, has the parts all shut away from view and difficult to get at. The consequence is that even many English companies here get most of their locomotives from the United States." Once more: "In agricultural machinery there can be little doubt that the Americans have got well ahead with their comparatively cheap, light, attractive implements. . . . As regards reapers, winnowing and sowing machines, ploughs, rakes and forks, the Americans gain ground every day, and have almost established a monopoly." He affirms that America cannot compete with Sheffield in steel rails and in cutlery, and points out that England has monopolized the trade in corrugated iron roofing.

The Iron and Steel Production of 1893.

Returns are now in from the principal producing nations, and they stand as follows, two years being given as a matter of comparison:

Production of Pig Iron, Tons.

	1892.	1893.
United States	9,157,000	7,124,502
United Kingdom	6,616,890	6,829,841
Germany	4,793,003	4,953,148
France	2,057,258	2,033,567
Belgium	753,268	760,296
Sweden	478,696	450,901
Total	23,856,115	22,152,255

In the above table the production of the United States and of the United Kingdom is in gross tons; for other countries in metric tons.

The table covers the production of commercial nations except Austria-Hungary, and is probably within about a million tons of the total production. It shows that the net loss of production from the countries mentioned amounts to 1,703,860 tons, or about 7 per cent. The loss of the United States, however, was 2,032,498 tons, or 22 per cent., as compared with 1892. Our prices for three years, and at present, have been as below:

	1891.	1892.	1893.	Last of March, 1894.
No. 1 anthracite	$17.52	$15.75	$14.25	$13.25
Bessemer pig	15.95	14.37	12.87	10.35
Steel rails	29.92	30.00	28.12	24.00
Steel billets	25.23	23.63	20.44	15.50

In other countries prices have held up very well. Scotch warrants, G. M. B. brands, were quoted on the last of the month at 42s. This is as against averages of 47s. 2d., 41s. 10d. and 42s. 3¾d. from 1891 to 1893. But for both 1886 and 1888 the average price was 39s. 11d., for which years our average prices for No. 1 anthracite were $18.75 and $18.88. That is to say, our small production is forced on us by a lack of confidence in the future, and other nations are increasing their outputs through brighter financial prospects.

The production of Bessemer steel ingots has been as below, in tons:

	1892.	1893.
United States	4,168,435	3,123,524
United Kingdom	1,500,810	1,493,454
France	825,486	803,063
Belgium	260,037	273,058
Sweden	82,386	84,837

It should be noted that in the case of France, Bessemer and open hearth are returned together.

The British production of rails was 579,386 tons, a gain of 3,550 on the output of 1892, but, excepting that year, the smallest product for a long time. Our output for 1893 was 1,036,353 tons, the smallest, Mr. Swank says, since 1885.

A Big Load of Logs.

The *Tradesman* reports that at Stillwater, Minn., recently, 111 logs, equal to 37,800 ft. of lumber, were hauled in from Underhill's camp, 2½ miles, in one sled-load. At 2¼ lbs. per foot, such a load would weigh 47 tons. This is said to be a larger load than that exhibited at the World's Fair.

The Mesaba Mines.

The current reports that the Lake Superior Consolidated Mines, the Rockefeller syndicate, had sold 2,000,000 tons of Mesaba ore at $2.25 a ton are not correct. Just how much Rockefeller ore is to go forward is not known, but no large sales have been made. Probably none of the better grade Mesaba will be sold at $2.25. About 6,500 men are at work at all the Lake Superior iron mines, or 50 per cent. of a full force.

Broadway Car Lighting.

In commenting on the Broadway cable management and its new cars, which have Pintsch lamps, the New York *Tribune* editorially says: "One feature is especially deserving of notice and appreciation. They are thoroughly lighted. Indeed, it is not too much to say that now, for the first time, it is possible to read with comfort in a public conveyance at night, and the contrast is so sharp and so delightful as to make the dim illumination of other surface cars and of the elevated railroad trains doubly irritating and discreditable. If hitherto there has been a disposition to tolerate the feeble and flickering lamps which have been persistently imposed on travelers it will be replaced by a sense of indignation at the incompetence or parsimony which keeps them in use."

Chicago & Northwestern Fast Mail.

A fast mail train was put on the Galena division of the Chicago & Northwestern Railroad, Monday, April 2 No passengers are carried, the train being put on only for fast express and mail service, and especially to carry the Chicago morning papers. Leaving Chicago at 3 a. m., Cedar Rapids is reached at 8:18 a. m., and Omaha at 5:30 p. m., the run of 492 miles being made in 14 hours and 30 minutes, the regular time of the fastest passenger train being 15 hours and 45 minutes. Connections are also made so that the daily papers reach Des Moines at 12:30 p. m. and Sioux City at 9:30 p. m. of the same day.

A Coal Train Covering Five Acres.

The largest tow which ever moved on the Ohio or the Mississippi River reached New Orleans on March 31. It consisted of 45 boats or barges, drawn by the Joseph B. Williams, the largest and most powerful towboat on the Mississippi. The 45 vessels carried 38,230 tons of coal, enough to load 1,920 twenty-ton coal cars. Seven boats were left at Red River to supply the planters on the Red, Atchafalaya and Téche; seven at Baton Rouge for the planters in that locality; seven at Donaldsonville for Bayou La Fourche, and the rest were for New Orleans. The tow covered nearly five acres of the Mississippi, being 236 ft. wide by 875 long.

The Metropolitan Elevated Injunction, Chicago.

The Supreme Court has rendered a decision vacating a writ of supersedeas issued in favor of the West Chicago Street Railway Co., and against the Metropolitan Elevated Railway, prohibiting the latter from crossing the street railroad property on Van Buren street, west of Aberdeen street. This writ of supersedeas was, in effect, an injunction forbidding the Metropolitan to cross the property of the West Chicago City Railway. The Metropolitan people now declare that they will have their road open and ready for business early in July.

Must Talk United States.

A press dispatch from Kansas City reports that the Court of Appeals on March 26 affirmed the decision of lower court awarding Sampson D. Loe $2,000 damages for injuries received while in the service of the Chicago, Rock Island & Pacific Railroad. Loe was employed in a section gang with three Swedes. While unloading logs he was injured, owing to the Swedes not understanding English. The court holds that the road was negligent in employing men ignorant of the English language.

The Paint Spraying Patents.

A Grand Rapids (Mich.) firm has brought suit against the World's Columbian Exposition Company for an alleged infringement of a patent protecting a special method of painting by machinery with a hose. The damages are placed at $100,000, and it is asked that the Directors of the Exposition Company be enjoined from winding up the business of the company until the claims are settled.

Land Grant Decision.

The Secretary of the Interior has revoked the department decision of Nov. 17, 1892, which refused approval of selections of land made by the Southern Pacific Railroad Co. in lieu of odd sections of land relinquished by it under the act of June 22, 1874, so far as the former decision held that the alternate sections within the grant limits are not subject to selection under that act. The decision affects the rights of other roads having similar land grants.

A Locomotive Model.

Mr. Stephen E. Mastin, of Odenweldertown, Easton, Pa., sends us a photograph of a wooden model of a locomotive cut out by him with a jackknife. The principal dimensions are 3 ft. ¼ in. over all, cylinders 2 in.x2¼, driving wheels 5¾ in., total wheel base, 2 ft. All parts outside of the cab are workable and follow closely the principles and design of an ordinary locomotive. The model taken was an 8-wheel Schenectady engine built for the New York Central in 1889. The photograph shows an accurate and good piece of work. The model was not made to sell but for Mr. Mastin's amusement; he tells us that he has always had a desire to become an engineer and never had a chance to. Certainly a man with the intelligence and mechanical faculty to do what he has in making this model ought to have a chance to become a locomotive engineer if he wants to.

Beginning in Season.

The Long Island Railroad Company has made the following announcement: "Owing to the possibility that the so-called two-cent fare bill now before the Legislature may become a law, this company is obliged to give notice that in that event the commutation and other special ticket rates on the Long Island Railroad must be abolished. The company very greatly regrets the necessity which compels this action, which is taken in order that it may meet its obligations and for the protection of its stockholders."

A Mississippi River Tow.

The largest tow on record was pushed down the Mississippi about the end of last month, arriving at New Orleans on the 31st. There were 45 barges which carried 38,230 tons, or some 1,900 carloads. The area covered by this tow was 236 feet by 875 feet, or about 4¾ acres. It was handled by one boat, the Joseph B. Williams, which as usual on the Mississippi was placed behind the tow, and steered it by holding back when passing bends in the river.

Reading's Coal Property.

President Harris, of the Philadelphia & Reading, has recently prepared a statement, published in the form of a letter, giving a brief account of the coal properties owned by the company. He denies the correctness of the statement often made, that the Reading company owns one-half of all the anthracite coal in the United States, and says: The only careful and thorough estimate ever made of the probable amount of coal in the Reading company's land, which estimate was made by its own engineers in 1880, shows that they contain between 33 and 34 per cent. of the total anthracite tonnage in Pennsylvania. In 1887 the Reading company did send nearly one-third of the anthracite to market, but the year before it sent less than 27 per cent., and the year after it sent about 29 per cent., so that 1887 cannot be taken as a fair test of the relative productiveness of the Reading properties at that time. The table below shows the average amount of coal carried by the Reading and of that sent from the whole anthracite region, per year, for the periods named.

	Average Reading tons.	Average total anthracite tons.	Percentage.
1869-73	5,050,796	17,333,164	29
1874-78	5,447,398	19,394,631	28
1879-83	6,947,459	27,750,746	25
1884-88	6,999,305	33,479,958	21
1889-93	8,246,733	39,557,405	21

On the whole, the Reading tonnage is gaining, though not in the same proportion as the total, it having increased 63 per cent. in 20 years, while the total anthracite production has increased 128 per cent. This is due, not, as is so frequently urged, to unfaithfulness on the part of the persons who are managing the Reading properties, but to a variety of causes. As a rule, the coal lies much deeper in the Reading's territory than in the other coalfields, is more difficult and more expensive to mine, is associated with more slate and other refuse which require to be separated from it, and the mines require much more pumping and much more timber to keep the passages open. All of these causes handicap the Reading because they make its coal more expensive, and the advantage of late years has been with the Northern Companies whose coal was more cheaply mined, and whose colliery openings were more cheaply made. The Reading has also been handicaped by its enormous debt, so that it would have been foolish at any time for it to have gone into the market to mine coal regardless of the price at which it must be sold, and this price could not have been maintained without very conservative and careful handling on the part of the Reading company. The Reading does control most of the Lykens Valley coal and most of the Schuylkill red ash, but there is not a great deal of the latter. The Reading's facilities for mining and transporting coal are fairly abreast of its present output, but not much in excess of that. The cost would be ruinous if the company were to attempt to open mines in advance of its ability to market coal. When you consider that it takes an expenditure of about $2,000,000 and two or three years' time to get ready to produce 1,000,000 tons of coal annually, you will see that it is not the easy thing that the newspapers generally assume it to be to rapidly increase the production.

Lake Traffic.

Although the straits have been open for some time the season's business was not fairly commenced until April 1, when a fleet of 22 grain laden vessels left Chicago, South Chicago and Milwaukee. One of these was bound for Port Huron; all of the rest for Buffalo. Out of the fleet of 154 vessels wintering at these ports, it is thought that not over one-half will sail before the 15th inst. The grain now afloat is: wheat, 2,502,000 bushels; corn, 7,127,000 bushels; oats, 204,000 bushels, and barley, 170,000 bushels.

BRIDGE BUILDING.

Brooklyn, N. Y.—A bill has been introduced in the New York Legislature providing for bridges over Newtown Creek, between Queens and Kings counties, at an expenditure of $500,000, to be borne jointly by the counties named.

Buffalo, N. Y.—The proposed bridges over the Buffalo River at the foot of Commercial street, and over the Blackwell Canal, were the subject of a hearing before the Committee on Bridges of the City Council last week. Herbert P. Bissell, of Buffalo, represented the petitioners and made an argument in favor of authorizing the erection of the bridges. Estimates have been prepared by ex-City Engineer Mann, but no detailed plans have yet been made. At the hearing, representatives of the steamboat lines, including the Western Transit Co., the Northern Steamship Co. and others, opposed the erection of the bridges. The matter was laid over for two weeks in order to prepare more accurate estimates of the cost of the bridges and the land damages.

Casselman, Ont.—The new iron bridge over the Nation River, destroyed by the floods, will be rebuilt at once.

Columbus, O.—Bids have been received by the county commissioners for the construction of the superstructure for the bridge on the Sunbury Turnpike over Alum Creek, as follows: S. H. Martin, $3,100; Wrought Iron Bridge Co., $4,900, Youngstown Bridge Co., $3,930; F. J. Myers Mfg. Co., $4,100; Toledo Bridge Co., $4,143; Jackson Bridge Co., $5,269; Variety Iron Works, $4,975; Massillon Bridge Co., $4,400; Penn Bridge Co., $5,000, $4,500, $4,250 and $4,000; Columbus Bridge Co., $4,372 and $4,895; G. W. Knopf, $4,485.

For the Clifton avenue bridge over Alum Creek the following bids were received: G.W. Knopf, $5,785; Cook, Grant & Cook, $5,756; Etna Consolidation Co., $7,500; Wrought Iron Bridge Co., $5,888; Samuel H. Martin, $4,600 and $7,250; F. J. Myers Mfg. Co., $5,790; King Iron Bridge Co., $6,688; Jackson Bridge Co., $7,400; F. Hampshire & Co., $7,770; Youngstown Bridge Co., $5,230; Toledo Bridge Co., $5,344; Massillon Bridge Co., $5,250; Canton Bridge Co., $7,600; Penn Bridge Co., $7,500, $6,850 and $6,850 (three plans); Variety Iron Works, $6,600; Brown-Ketcham Iron Works, $5,600; Columbus Bridge Co., $5,295, $5,586.50, $5,794.10 and $6,498.50.

All differences between the railroads and the county commissioners' plans for the proposed St. Clair avenue viaduct have been settled. The structure is to have a clearance above the tracks of 20 ft., and this agreement assures the speedy erection of the viaduct without litigation. The sale of the bonds brought $63,000 with which to build the viaduct.

Elmira, N. Y.—The City Council will shortly consider the question of erecting one or more new bridges across the Chemung River in this city.

Kansas City, Mo.—The House Committee on Commerce has reported favorably a bill similar to one which passed the United States Senate last week, allowing the Kanas City & Atlantic Co., which owns the franchises of the Winner bridge at Kansas City, to complete the bridge across the Mississippi River without a free wagonway. The original charter contained a clause binding the company to build a bridge with a free wagonway. The present company, of which Theodore C. Bates, of Worcester, Mass., is President, have claimed that this clause has prevented the company from securing the financial aid needed to complete the unfinished structure. They have claimed that with this clause eliminated the bonds could be sold and the bridge finished.

Lexington, Mo.—The Lexington Bridge & Terminal Co. has been incorporated to build a bridge over the Missouri River at this point. The incorporators are: William D. McCausland, J. C. McGrew, William Morrison, E. Hoffman, R Taubman, J. W. Waddell, William F. Kerdolff, E. Chansler, R. Field and Leo Keller.

Lowell, Mass.—The proposed bridge across the Merrimac River at Moody street is meeting with no opposition, and the City Council will probably authorize its erection immediately.

New Brunswick, N. J.—The proposed Pennsylvania Railroad bridge across the Raritan River at this point, which has been so strenuously opposed by the Board of Trade of New Brunswick, is not to be built this year, though this decision is not due in any way to the opposition that has been raised. The present Pennsylvania bridge has a draw span and the company desire to replace it with a four-track structure without a draw. The people in New Brunswick claimed that the Raritan River was navigable above the site of the bridge and insisted that a draw span should be built. The United States engineers last week decided that the river was not navigable above the bridge. After this opinion was published it was announced that, as the elevation of the tracks through New Brunswick would be postponed, it has been decided not to do any work at present on the new bridge.

Niagara Falls, N. Y.—Plans have been prepared for a new single-span steel bridge to be built this summer across the hydraulic canal at Buffalo street. This is to replace the present two-span bridge, which is only 70 ft. wide between abutments, while the new bridge will have a single span of 100 ft.

Ottawa, Ont.—A new steel bridge will be constructed by the City Council, across the canal at Maria street.

Philadelphia.—The bill appropriating nearly $800,000 for new bridge work in the city during the next year failed to pass the City Council last week before adjournment, and the whole matter now goes over to the new Council. The Director of Public Works and the City Council Committee had agreed upon an apportionment of this fund between a dozen proposed bridges in Philadelphia, but the City Council objected to the bill because no agreement had been made with the various railroads providing for their assuming part of the cost of some of the bridges. This postpones both the proposed Gray's Ferry bridge over the Schuylkill River and the Schuylkill Falls bridge. These are the most important bridge projects affected by this action of the council.

Rankin, Pa.—The bill introduced by Congressman Dalzell, of Pennsylvania, authorizing the West Braddock Bridge Company to build a bridge over the Monongahela River, between Rankin and Mifflin township, has passed the House of Representatives.

Red Wing, Minn.—A bill introduced by Congressman Hall, of Minnesota, authorizing the construction of a bridge over the Mississippi at Red Wing, Minn., has passed the House of Representatives.

Sioux City, Ia.—The following bids were received for building a number of new pile bridges in the Second district, the figures representing the price per foot: Charles Stewart, Salix, Ia., $2.75; N. A. Holbrok, Smithland, Ia., $3.95; R. S. Hammon, Lakeport, Ia., $3.00; Ford & Conlin, Sioux City, Ia., $6.75; Smith & Conlin, Sioux City, Ia., $6.40; T. F. Jones, Moville, Ia., $4.15; A. Gilpin, $4.20; Ben. Glover, Sloan, Ia., $3.15, and T. F. Harrington, Moville, Ia., $4.25.

St. Stephen, N. B.—Mr. Hott, C. E., has secured the acceptance by the Government of his plans for the proposed steel bridge between St. Stephen and Calais. The Calais authorities have also approved the plans, and the contract for the construction will be awarded at an early date.

Winnipeg, Man.—The Committee on Works will shortly ask for tenders for iron superstructure of the bridge to be built over the Assiniboine River near Maryland. The estimated cost is $22,000.

Xenia, O.—A bill has been introduced in the Legislature by Representative Cummings to require the Pittsburgh, Cincinnati, Chicago & St. Louis Railroad to construct an iron bridge over the tracks at the Monroe street crossing.

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

The Federal Court holds that the guaranteeing by a railroad passenger agent that a theatre company to whom he sells a party rate ticket shall arrive at their destination at a given time is not the giving of an undue preference within the Inter-State Commerce act.[1]

The Supreme Court of Texas holds that receivers operating a railroad under judicial appointment are not within the statute, which prescribes a penalty for unjust discrimination in freight rates by "railroad companies."[2]

In Washington the Supreme Court rules that the statute of 1883, known as the "Gross Earnings Law," which provided for the taxation of the gross earnings of railroad corporations, and exempted them from all other taxes, was not in conflict with Organic Act Wash. T., which provided that "all taxes shall be equal and uniform, and no distinction shall be made in the assessments between different kinds of property, but the assessments shall be according to the value of the property," since such provision did not prohibit the legislature from exempting the property of any person or corporation from taxation.[3]

In Georgia the Supreme Court decides that the statute making it a misdemeanor to run a freight train on any railroad in the state on the Sabbath day, is a regulation of internal police, and not of commerce, and not in conflict with the U. S. constitution even as to freight trains passing through the state, and laden exclusively with through freight.[4]

In the Federal Court it is held that railroads have the right to require that state railroad commissions fix just freight rates, and the changing of such rates so as to injure the railroad company in its property rights is a deprivation of property without due process of law, within the inhabitation of the state and federal constitutions, and a court may inquire into the justness of the rates, and appoint a special master to take testimony in relation thereto, and to report thereon.[5]

In the Federal Court it is held that a railroad organized under the laws of Washington has no authority to transfer its franchises, except by sale and conveyance or lease made in accordance with the statutes relating

to the transfer of titles to such property; and where, by a so-called "traffic agreement," the trustees, without the consent of the minority stockholders, in effect, transfer to another railroad company the entire control and management of the property, for practically the legal lifetime of the corporation, such contract is illegal and void.[6]

In Minnesota, a railroad company, desiring to use a depot company's terminal facilities, then shared by five roads, demanded as a right the issue to it of one-sixth of the depot company's stock at par value, $58,333.33. The depot company contended for a market value much higher. Pending litigation, the companies agreed that the road should be admitted to depot privileges on temporary terms, "and to be entirely without prejudice to the rights and claims of rights of the parties as asserted in said suit;" the road to pay a monthly rental of $833.33 and its proportion of expenses. The suit, begun in 1885, was ended in the Supreme Court in the road's favor in August, 1891. The road had by that time paid under its contract $58,222.03. The Supreme Court decides that the road having been forced into the contract by the depot company's own wrong, said payments must be taken as on account of stock, and not mere rental. The phrase "without prejudice" could not apply to proceedings in the suit only.[7]

The same court holds that under a statute forbidding carriers to give unequal or unreasonable preferences or impose disadvantages on any person, company or locality, a railroad company is obliged to give equal or substantially similar facilities for shipping grain to all persons who in good faith erect, or desire to erect, warehouses at any station; and if it refuse a request for an elevator site on a right of way such as it grants to others, and the warehouseman buys land adjoining, and builds his elevator thereon, the company cannot refuse to build a spur on its land to accommodate his business.[8]

In Georgia the Supreme Court rules that though a company is authorized by its charter to carry both freight and passengers, a city may grant it rights and privileges, with a stipulation that no freight shall be carried through the streets except by permission of the mayor and council.[9]

Injuries to Passengers, Employees and Strangers.

The Supreme Court of Texas decides that evidence that a person who was on a train at the time of an accident thereto, sitting among the passengers, without any attempt at concealment, was on the train without the knowledge or consent of the conductor, does not show her to have been a trespasser, though at the station, before boarding the train, the conductor had refused her request that she be carried free as the wife of an employe of the road.[10]

In Texas it is held that a passenger occupying more than one seat in a railroad train, contrary to the rules of the company, and who resists any attempt of the trainmen to confine him to a single seat by displaying a pistol, may be removed from the train, whether other passengers were inconvenienced or not.[11]

In Texas it is held that where a trainman in authority tells a shipper of live stock that the train will remain standing for some time at a certain point, and directs him to look after the stock at that time, he may rely on it that the train will not be moved without notice to him, as it is customary for shippers to assume dangerous positions when caring for their stock.[12]

In Tennessee it is declared that a sleeping car company is liable for money stolen from a passenger by the porter of the car on which he is traveling.[13]

In the Federal Court it is held that a mail clerk, traveling upon a railway in the service of the United States, is a passenger for hire in so far as the railroad company's liability for his injury is concerned.[14]

A Wisconsin statute provides that an engine, before crossing any highway, except in cities and villages, shall have its whistle blown 80 rods from such crossing. The Supreme Court holds that where, in an incorporated village, an engine whistled at the whistling post for one street, and continued to whistle till it arrived at another whistling post, 400 ft. away, this was not negligence on account of which one who was injured by his horse becoming frightened at the noise could recover from the railroad company. Neither was it negligence to allow steam to escape with considerable noise from the cylinder cocks.[15]

The Supreme Court of Mississippi decides that a railroad is liable for a false arrest and imprisonment by its agent of a man who used a water closet at its station set apart for ladies only, irrespective of the statute which provides that station agents shall preserve order in the waiting rooms, and may arrest and deliver to some officer all persons guilty of disorderly conduct, and hence the constitutionality of such act is not involved in an action brought against it by the person arrested.[16]

The Supreme Court of New York rules that in an action by a conductor for injuries received in falling off the rear of his train while passing through it collecting tickets, the train being at the time in a tunnel, where from the inside of the rear car the reflection made it appear that there was another car behind, the negligence complained of being defendant's failure to have a chain across the end of the rear platform, a requested charge that, if the plaintiff knew there were but three cars in the train he could not recover, was properly refused, as his mind might have been so occupied with his duties that he could have for the moment forgotten the number of cars, without being guilty of contributory negligence.[17]

In Indiana a brakeman on a freight train is held to be the conservant of the conductor of another train, through whose negligence a collision occurs.[18]

In the Federal Court it is held that a telegraph operator at a way station, whose duty it is to display signals to prevent one train following another on the same track too closely, is a fellow servant of a locomotive fireman, injured in a collision caused by the operator's neglect of such duty.[19]

[1] Foster v. C., C. C. & St. L. R. R. Co., 56 Fed. Rep., 434.
[2] Bonner v. Franklin Co., 23 S. W. Rep., 317.
[3] Columbia & P. S. v. Chilberg, 34 Pac. Rep. 163.
[4] Hennington v. State, 17 S. E. Rep., 1007.
[5] Clyde v. R. & D., 57 Fed. Rep., 436.
[6] Earle v. Seattle, L. S. & E., 56 Fed. Rep., 909.
[7] C., St. P. & K. C. v. St. Paul, U. D. 56 N. W. Rep., 129.
[8] Farmers' Warehouse Association v. Min., St. P. & S. S. M., 56 N. W. Rep., 248.
[9] Powell v. M. & I. S., 17 S. E. Rep., 1027.
[10] G. H. & S. A. v. Snead, 23 S. W. Rep., 277.
[11] G. C. & S. F. vs. Moody, 22 S. W. Rep., 1009.
[12] Int. & G. N. vs. Armstrong, 23 S. W. Rep., 236.
[13] Pullman Palace Car Co. v. Gavin, 23 S. W. Rep., 70.
[14] Arrowsmith v. N. & D., 57 Fed. Rep., 165.
[15] Cahoon v. C. & N. W., 55 N. W. Rep., 900.
[16] Ill. Cent. v. King, 13 South. Rep., 824.
[17] Fiero v. N. Y. C. & H. R., 24 N. Y. S., 805.
[18] Becker v. B. & O., 57 Fed. Rep., 188.
[19] C., N. O. & T. P. v. Clark, 57 Fed. Rep., 125.

MEETINGS AND ANNOUNCEMENTS.

Dividends:

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Rock Island & Pacific, quarterly, $1 per share, payable May 1.

Delaware, Lackawanna & Western, quarterly, 1¾ per cent., payable April 20.

Mexican Northern, quarterly, 1½ per cent., payable April 20.

Stockholders' Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Chicago & Grand Trunk, annual, Chicago, April 11.

Cincinnati, Saginaw & Mackinaw, annual, Saginaw, Mich., April 17.

Delaware & Hudson Canal, annual, New York City, May 8.

Grand River Valley, Jackson, Mich., April 25.

Harlem River & Port Chester, annual, New York City, April 14.

Lake Shore & Michigan Southern, annual, Cleveland, O., May 2.

Michigan Central, annual, Detroit, Mich., May 3.

New York Central & Hudson River, annual, Albany, N. Y., April 18.

New York, Chicago & St. Louis, annual, Cleveland O., May 2.

Pittsburg, Cincinnati, Chicago & St. Louis, annual, Pittsburgh, Pa., April 10

St. Louis, Alton & Terre Haute, annual, St. Louis, Mo., June 4.

Toledo, Ann Arbor & North Michigan, annual, Toledo, O., April 18.

Union Pacific, annual, Boston, Mass., April 25.

Union Pacific, Denver & Gulf, annual, Denver, Col., April 10.

Technical Meetings.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *Master Car Builders' Association* will hold its annual convention at Saratoga, N. Y., beginning June 12. The hotel headquarters will be at Congress Hall, H. S. Clements, Manager.

The *Master Mechanics' Association* will hold its annual convention at Saratoga, N. Y., beginning June 18.

The *Association of Air Brake Men* will hold its first annual meeting at Columbus, O., April 10.

The *American Railway Association* will hold its spring meeting in the Hotel Brunswick, Fifth avenue and Twenty-sixth street, New York City, on April 11.

The *National Association of Local Freight Agents* will hold its annual convention at Pittsburgh, Pa., June 12, 13, 14. The headquarters will be at the Monongahela House.

The *Association of American Railway Accounting Officers* will hold its next annual meeting at Washington, D. C., commencing May 30.

The *Western Railway Club* meets in the rooms of the Central Traffic Association, Monadnock Building, Chicago, on the third Tuesday in each month, at 2 p. m.

The *New York Railroad Club* meets at the rooms of the American Society of Mechanical Engineers, 12 West Thirty-first street, New York City, on the third Thursday in each month, at 8 p. m.

The *New England Railroad Club* meets at Wesleyan Hall, Bromfield street, Boston, Mass., on the second Wednesday of each month.

The *Central Railway Club* meets at the Hotel Iroquois, Buffalo, N. Y., on the fourth Wednesday of January, March, April, September and October.

The *Southern and Southwestern Railway Club* meets at the Kimball House, Atlanta, Ga., on the third Thursday in January, April, August and November. The next meeting will be on Thursday, April 19, at 10 a. m. The subjects for discussion were published in our issue of March 23.

The *Northwest Railroad Club* meets at the Ryan Hotel, St. Paul, on the second Tuesday of each month at 8 p. m.

The *Northwestern Track and Bridge Association* meets at the St. Paul Union Station on the Friday following the second Wednesday of March, June, September and December, at 2:30 p. m.

The *American Society of Civil Engineers* meets at the House of the Society, 127 East Twenty-third street, New York, on the first and third Wednesdays in each month at 8 p. m.

The *Western Society of Engineers* meets on the first Wednesday in each month, at 8 p. m. The headquarters of the society are at 51 Lakeside Building, Chicago.

The *Engineers' Club of Philadelphia* meets at the House of the Club, 1122 Girard street, Philadelphia, on the first and third Saturdays of each month, at 8 p. m.

The *Boston Society of Civil Engineers* meets at Wesleyan Hall, 36 Bromfield street, Boston, on the third Wednesday in each month, at 7:30 p. m.

The *Engineers' Club of St. Louis* meets in the Missouri Historical Society Building, corner Sixteenth street and Lucas Place, St. Louis, on the first and third Wednesdays in each month.

The *Engineering Association of the South* meets on the second Thursday in each month, at 8 p. m. The Association headquarters are at The Cumberland Publishing House, Nashville, Tenn.

The *Engineers' Society of Western Pennsylvania* meets in the Carnegie Library Building, Allegheny, Pa., on the third Tuesday in each month, at 7:30 p. m.

The *Technical Society of the Pacific Coast* meets at its rooms in the Academy of Sciences Building, 819 Market street, San Francisco, Cal., on the first Friday in each month, at 8 p. m.

The *Association of Engineers of Virginia* holds informal meetings the third Wednesday of each month, from September to May, inclusive, at 710 Terry Building, Roanoke, at 8 p. m.

The *Denver Society of Civil Engineers* meets at 36 Jacobson Block, Denver, Col., on the second and fourth Tuesdays of each month except during July, August and December, when they are held on the second Tuesday only.

The *Montana Society of Civil Engineers* meets at Helena, Mont., on the third Saturday in each month, at 7.30 p. m.

The *Engineers' Club of Minneapolis* meets in the Public Library Building, Minneapolis, Minn., on the first Thursday in each month.

The *Canadian Society of Civil Engineers* meets at its rooms, 112 Mansfield street, Montreal, P. Q., every alternate Thursday at 8 p. m.

The *Civil Engineers' Club of Cleveland* meets in the Case Library Building, Cleveland, O., on the second Tuesday in each month, at 8 p. m. Semi-monthly meetings are held on the fourth Tuesday of each month.

The *Engineers' Club of Cincinnati* meets at the rooms of the Literary Club, No. 24 West Fourth street, Cincinnati, O., on the third Thursday in each month at 7:30 p. m.

The *Engineers' Club of Kansas City* meets in Room 200, Baird Building, Kansas City, Mo, on the second Monday in each month.

The *Engineers' and Architects' Club of Louisville* meets in the Norton Building, Fourth avenue and Jefferson street, on the second Thursday in each month at 8 p. m.

The *Civil Engineers' Society of St. Paul* meets on the first Monday of each month.

The *Scandinavian Engineering Society of Chicago* meets in room 309, Title and Trust Building, 100 Washington street, on the third Thursday in each month.

The *Foundrymen's Association* meets at the Manufacturers' Club, Philadelphia, Pa., on the first Wednesday in each month.

Central Railway Club.

The regular meeting of this club was held in Buffalo, March 28, President A. M. Waitt in the chair. He announced that several new members had been added since the last meeting and that the printed proceedings of the various railroad clubs throughout the country were hereafter to be exchanged so that all members could have the benefit of them. In view of the increased labor connected with the Secretary's office, the subject of a salary was brought up, and a committee appointed to report upon the subject at the next meeting. Mr. Chubb's paper on air-brakes was discussed and Mr. Morford read a paper on freight yards. Reports of these will be found elsewhere. The next meeting will be held April 25 and the Rules of Interchange will be discussed. A committee has been appointed to report upon the subject, consisting of H. C. McCarthy, E. D. Bronner, Robert Gunn, G. W. West and R. S. Miller.

Engineers' Club of St. Louis.

The club met on March 21, forty members and four visitors present. E. B. Fay was elected to membership. Applications for membership were announced from Geo. Benneke, assistant engineer Bellefontaine Bridge, and Chas. D. Mitchell, assistant engineer water works extension.

Mr. S. Bent Russell then addressed the club on the leading engineering features connected with the water works extension, together with the organization and methods of the engineering force. Particular attention was paid to the question of determining the design of inlet tower, intake tunnel, engine house and conduit, together with a description of the methods employed in construction and the difficulties encountered. The conduit is about 37,000 ft. long. From the Chain of Rocks to Baden it is 11 ft. in diameter, and is expected to deliver 100,000,000 gallons in 24 hours. From Baden to Bissell's Point it is 9 ft. in diameter, and has a capacity of 65,000,000 gallons. These calculations are based upon a computed velocity of 2 ft. a second. The address was illustrated by numerous lantern slides, showing the progress of the work. The hour being late, adjournment was had without discussion.

Engineers' Club of Cincinnati.

At the March meeting Mr. C. Wood, Chief Engineer of the Cincinnati, Hamilton & Dayton road, read a paper on the construction of a new freight-house recently built by that company at Cincinnati for outbound business. The principal building and an additional covered platform are constructed of ironwork, having posts of four angles latticed, resting in cast iron shoes filled with concrete; the purlins, trusses and all parts are of iron. The sides above the sash, over the doors, and the roof are covered with galvanized iron. The floor is of 3-in. oak stringers bedded in cinders. The rolling steel shutters are made in two 10-ft. parts in 20-ft. space, with the post between hung on a pivot so as to allow of being swung back, thus making the opening 20 ft. in the clear.

The particular feature was the difficulty to be overcome from the peculiar situation—the shape of the lot being approximately triangular—and the grades of the streets fronting on two sides. The intersection of these streets at the corner of the building was some 15 ft. higher than the grade of the streets at the crossing of the railroad. This necessitated a grade in the floor of the building, from the street to the tracks; a grade in the building from one end to the other, a grade in the tracks adjoining the building and a change in the direction and width of the building, which required a separate plan for each panel and truss throughout the structure. The building is 684 ft. long and the entire arrangement gives a capacity of 106 cars.

American Society of Civil Engineers.

The programme for the meeting of April 4 included a paper by Fr. von Emperger, C. E.. M. Austrian Society of Civil Engineers and Architects, on the "Development and Recent Improvement of Concrete-Iron Highway Bridges." We shall give a considerable abstract of this paper shortly.

At the meetieg to be held on Wednesday, April 18, the first paper will be read by Archibald A. Schenck, on the "Relation of Wheels to Frog Points and Guard Rails." The second paper to be presented is by William Lee Sisson, Assoc. M. Am. Soc. C. E., on the "Harper's Ferry Improvement."

The Annual Convention.—The date for the opening session of the convention has been fixed for Wednesday, June 20, and the place, the Cataract House, at Niagara Falls. Further details will be given when they are more definitely arranged.

Association of Engineers of Virginia.

The regular monthly meeting of the association was held on March 21 with the president, Mr. Charles S. Churchill, in the chair, and seven members present. Owing to the absence of Mr. R. P. Patterson, who was to have read a paper on "Blast Furnace Construction," Mr. Samuel Wallis gave a talk on "Paints," and brought out some valuable and interesting information.

The next informal meeting will be on April 18; subject, "Blast Furnace Construction," opened by Mr. R. P. Patterson; alternate subject, "Boiler Construction," opened by Mr. G. R. Henderson.

PERSONAL.

—Mr. John L. Marvin has been appointed Receiver of the Jacksonville, Mayport & Pablo Railway & Navigation Co.

—Mr. E. A. Nixon, formerly Assistant General Freight Agent of the Jacksonville South-Eastern, has been appointed Traffic Manager of the Memphis Car & Foundry Company.

—Mr. Benjamin Wells, 80 years old, Station Master of the Philadelphia, Wilmington & Baltimore at Elkton, Md., has completed his 57th year in the service of the road at that station.

—Mr. Ross Mackenzie, Assistant Superintendent of the Eastern Division of the Canadian Pacific, has been

appointed General Manager of the Niagara Falls Park & River Electric Railroad.

—Mr. Thomas Miller, Superintendent and Master Mechanic of the New York & Northern, has been appointed Master Mechanic of the Metropolitan Street Railroad of New York City.

—Mr. James McNaughton, Superintendent of Motive Power of the Wisconsin Central, has been appointed Superintendent of the car department of that road, in addition to his present duties.

—Mr. W. L. Dunaway, Chief Dispatcher of the Missouri Pacific at Osawatomie, Kan., has been appointed Division Superintendent of the Colorado Division at Osawatomie, to succeed T. F. Dunaway, resigned.

—Mr. J. S. Turner, who has been Acting Assistant Mechanic and Road Foreman of the Mexican International, has resigned to accept the position of Superintendent of Motive Power of the West Virginia Central & Pittsburgh road.

—Mr. C. A. Hammond, Secretary of the American Society of Railroad Superintendents, and until recently Superintendent of the Boston, Revere Beach & Lynn road, is now with the National Switch and Signal Co. as Eastern Manager, with office at 32 Nassau street, New York City.

—Mr. T. C. Mendenhall has been appointed Assistant Superintendent of Motive Power of the Pennsylvania Railroad for the United Railroads of New Jersey Division to succeed Mr. Samuel Porcher, who was recently appointed Assistant Purchasing Agent of the Pennsylvania at Philadelphia.

—Mr. Earle C. Bacon, late of the firm of Copeland & Bacon, has opened an office as consulting and contracting engineer in the Havemeyer Building, New York City. Mr. Bacon has had a long experience in designing and building hoisting and mining machinery, and he will give special attention to that branch of engineering.

—Hon. James D. Yeomans, of Sioux City, Ia., and a member of the Senate of that state, has been nominated by President Cleveland to be Interstate Commerce Commissioner, in place of Commissioner McDill, also from Iowa, who died Feb. 28. Mr. Yeomans resided in Buffalo until five years ago, and is said to have had experience in railroad business.

—Mr. Joseph K. Bole, of Cleveland, has been elected President of the new American Steel Casting Co. Mr. Bole is well and favorably known to railroad men from his long connection with the Otis Steel Co., of Cleveland, of which he was up to last January one of the managing directors. He was President of the Solid Steel Co., of Alliance, O., whose plant will be operated by the consolidated company and is one of the Receivers of the Valley Railroad of Ohio.

Mr. Daniel Eagan, who has been the Secretary and Manager of the Sharon Steel Casting Co., has been elected Vice-President of the American Steel Casting Co. Mr. Eagan brings to his new office a large experience and is well known as one of the most successful steel men in the country. His headquarters with the new company will be at Chester, Pa., in charge of the Standard Steel Works.

—Mr. E. J. Spencer, the well-known electrical engineer, has resigned from the General Electric Co., to open an office as consulting and contracting electrical and mechanical engineer at the Security Building, St. Louis, Mo., last summer. Mr. Spencer had charge of the installation, maintenance and removal of the General Electric Co.'s exhibit at the World's Fair at Chicago. He was for about three years engaged in special work at the Lynn factory of the Thomson-Houston Electric Co., and previous to that he was for nearly nine years in the Corps of Engineers in the United States Army.

—With real sorrow we record the death of that good fellow, able man and accomplished railroad officer, Edward Barry Wall. His short life (he was under 38) had been successful beyond the ordinary measure of success. He was distinguished in his profession, had made a solid place for himself in the world and had won the respect and friendship of many of the best men in the land; but to us who knew him well his life seemed only to have begun. He was destined to go far. His intellectual powers, his force of character, the efficient, practical quality of his mind, the vigor of his body, his training, and the position which he had already taken, all conspired to make a brilliant career as certain as it can be for any human being. His death was untimely, if any man's death may be called so.

Wall's attainments were high; he had talent enough to profit by his opportunity for a sound scientific education; but we doubt if he would ever have won distinction as an investigator or designer in any strictly technical field. Apparently his instincts led him to affairs rather than to study. He became Superintendent of Motive Power of the Southwest system of the Pennsylvania lines when just over 27, and was one of the youngest railroad men in so high a place. Not long after that he told us that he had been put in charge too early to learn as much as he ought to about the details of his department, and we have no doubt that, in his modesty, and in the fullness of his appreciation of what there was to know, he always felt ignorant of details. But we have long estimated him as one of the rare men born to command. That is, his great success would have been made as an administrator, and not as a scientific man. He was made to use other men, and the world recognizes the scarcity and the value of executive power by giving to it the greatest prizes of life. Evidently the Pennsylvania Company has seen where Wall's strength lay, for it has been apparent for some time that he had been put in line of promotion leading toward the highest offices.

Mr. Wall was born April 25, 1856, at Kingsboro, N. Y., and was graduated from the Stevens Institute in 1876. He immediately began his railroad work as an apprentice at the Altoona shops, where he served in various capacities for six years. Then he became Assistant Master Mechanic on the Western Lines of the Pennsylvania, and in 1883 was appointed Superintendent of Motive Power of the Southwest System. In the Spring of 1893 he was sent to Chicago as Assistant to the First Vice-President of the Pennsylvania Lines, and after the close of the World's Fair business he went to Pittsburgh as Assistant to the General Manager. There he died April 1, in a hospital, from shock following an operation for appendicitis. He was buried at Columbus, O., on Wednesday.

Mr. Wall was an active and useful member of the Master Car-Builders' Association and the Master Mechanics' Association, and the records of those bodies are full of the results of his work on the most important committees. He was also a member of the American Society of Mechanical Engineers and a Trustee of the Stevens Institute of Technology.

ELECTIONS AND APPOINTMENTS.

Barclay.—Henry C. Davis has been elected President of this company, with headquarters at Philadelphia, Pa.

Central Pacific.—At a meeting of the Board of Directors of the company held last week Isaac L. Pequa was elected to fill the position of President, made vacant by the resignation of H. E. Huntington. James Gunn, George Lathrop, R. P. Schwerin, W. H. Mills and C. Bretherton have been chosen directors, leaving one vacancy in the Board.

Chicago & Alton.—At the annual meeting held in Chicago, April 2, T. B. Blackstone, J. J. Mitchell and A. C. Bartlett were re-elected directors.

Columbus Union Depot Co.—J. H. Schwartz, Chief Clerk in the office of General Superintendent Miller of the Pittsburgh, Cincinnati, Chicago & St. Louis road, has been appointed Secretary of this company, and John C. Snee, Paymaster of the same road, has been appointed Treasurer. Both positions were formerly held by C. M. Williams.

Elmira, Cortland & Northern.—The following officers were elected at a meeting of the directors: George S. Edgell, President; Henry W. Maxwell, Vice-President; Charles M. Reynolds, Secretary, and William J. Hehre, Treasurer, all with headquarters in New York City.

Fitchburg.—Governor Greenhalge, of Massachusetts, has reappointed Charles Francis Adams and David B. Kimball as State Directors of the Fitchburg Railroad.

Fort Worth & Denver City.—Howard F. Parke, formerly connected with the Missouri Pacific, has been appointed Superintendent of Car Service, with headquarters at Fort Worth, Tex.

Indiana & Illinois Southern.—F. E. Basler having resigned as General Freight and Passenger Agent, Charles P. Walker has been appointed General Freight Agent, with headquarters at Sullivan, Ind.

Jacksonville, St. Augustine & Indian River.—R. T. Goff, Master of Transportation, has been appointed Superintendent of this company, with headquarters at St. Augustine, Fla.

Kingston & Pembroke.—B. W. Folger, formerly Superintendent, has been appointed General Manager, with headquarters at Kingston, Canada. F. A. Folger, Jr., has been appointed Superintendent to suceed B. W. Folger.

Lehigh Valley.—H. H. Kingston, Receiver of the Pennsylvania, Poughkeepsie & Boston, has been appointed Assistant General Freight Agent of this company, with special jurisdiction over through freight.

W. S. Spiers, who has been the Assistant General Freight Agent of the company, with headquarters in Philadelphia, has been appointed to the same position, with headquarters in Chicago.

Missouri, Kansas & Texas.—Cary A. Wilson has been appointed Consulting Engineer, the appointment taking effect April 1. W. S. St. George has been appointed General Eastern Agent of the road, with office at 409 Broadway, New York, vice F. L. Manchester.

Missouri Pacific.—Louis W. Ewald has been appointed New England Passenger Agent, with office at 300 Washington street, Boston, vice George K. Delehanty, resigned.

New York, Lake Erie & Western.—J. H. Moore, General Foreman of the shops at Elmira, N. Y., has been appointed Master Mechanic at Buffalo, N. Y., to succeed James G. Hubbard, deceased.

New York, Ontario & Western.—Charles J. Russell, of London, having resigned as a director, Henry W. Cannon, President of the Chase National Bank, of New York, has been elected a director to fill the vacancy.

Norfolk & Western.—L. P. Ligon, Foreman at Radford, Va., has been appointed Master Mechanic, with headquarters at Bluefield, W. Va.

Panama.—The annual meeting was held in New York City, April 2. The only change in the Board of Directors was the election of Vernon H. Brown to fill the vacancy caused by the death of D. Lowber Smith. The following officers were elected: John Newton, President; J. Edward Simmons, Vice-President; Ernest L. Oppenheim, Treasurer, and E. A. Drake, Secretary.

Pennsylvania.—C. M. Mendenhall has been appointed Assistant Engineer of Motive Power with office at Jersey City, vice Samuel Porcher, promoted to be Assistant Purchasing Agent.

Peoria, Decatur & Evansville.—S. J. Cassety formerly General Agent at Evansville, Ind., has been appointed Assistant General Passenger and Freight Agent, with headquarters at Evansville.

Philadelphia, Reading & New England.—John P. Doran has been appointed Car Accountant, to succeed John F. Hedden, resigned.

State Line & Sullivan.—Henry C. Davis has been elected President, with headquarters at Philadelphia, Pa.

Thousand Islands.—F. S. Rathbur, in addition to his duties as Secretary and Treasurer, has been appointed Traffic Manager.

Toledo, Ann Arbor & North Michigan.—C. Stein has been appointed Superintendent of Transportation, vice J. B. Connors. D. McEntaffer has been appointed Superintendent of Roadway and Buildings, vice C. Stein, both with headquarters at Owosso, Mich.

West Virginia Central.—The annual meeting was held at 1727 North Tenth street, Philadelphia, Pa., on March 29, and the following directors were elected: Alexander Boudrou, F. T. Clark, A. K. Kepner, Samuel Masteller, Dr. John A. Austin, J. W. Aucott and Ward Beecher Hausman. Alexander Boudrou was elected President and Treasurer and F. T. Clark Vice-President and Secretary.

Wisconsin Central.—T. A. Price, Chief Clerk in the general freight office, has been appointed Assistant General Freight Agent, the appointment to take effect April 1. James McNaughton has been appointed Superintendent of Motive Power and of the Car Department, with headquarters at Waukesha, Wis.

RAILROAD CONSTRUCTION, Incorporations, Surveys, Etc.

Atlantic & Northwestern.—The proposed extension of this line beyond Egansville, Ont., toward Parry Sound is to be started this summer. The line between Renfrew and Egansville, 22 miles, was built in 1892 and is now operated by the Canadian Pacific between these points, paralleling the line of the Canada Atlantic. At a recent meeting of the stockholders at Montreal, Mr. T. G. Shaughnessy, Vice-President of the Canadian Pacific, acting as chairman, it was formally voted to approve the lease of this portion of the line to the Canadian Pacific, and to execute a mortgage for the extension west of Egansville, to be built this year.

Baltimore & Cumberland.—The proposals for building this railroad were received from over 200 contractors and the bids are now being examined and tabulated by Chief Engineer Chauncey Ives, at Chambersburg, Pa. Bids were asked on five and ten mile sections, but a number of proposals have been made for building the entire road between Cumberland and Hagerstown, Md., 84 miles. Charles McFadden, of Philadelphia, and the Fruin-Bambrick Construction Co., of St. Louis, are understood to have made bids on the entire line. It is thought likely that the company will be ready to announce the successful contractors by April 15.

Baltimore Northern.—The bill to grant this company a charter which was introduced in the early part of the present session of the Maryland Legislature has been finally reported from the committee with a majority report in favor of its passage. There is considerable opposition to the bill which, however, is not likely to be strong enough to defeat it. The railroad is projected by William Gilmor and John Henry Miller, of the Baltimore & Lehigh road, and will materially shorten the present line of the Baltimore & Lehigh. The surveys have been made from Baltimore to near Delta, Pa., and thence to Red Lion near York, Pa., the work in Pennsylvania being under the charter of the York & Schuylkill. The distance by the new line between Baltimore and York will be about 46 miles.

Buffalo & Susquehanna.—D. A. Craig, of Buffalo, and Frederick Crego, of Bradford, Pa., have the contract for the grading, masonry and bridgework on the extension of this road from Galeton east to Ansonia, Pa. where the line is to connect with the Fall Brook road. The distance is about 13½ miles, and the contractors state that the work will be finished during September next. They already have about 800 men engaged on the grading near Galeton, which is the present terminus of the operated road. C. W. Goodyear, of Buffalo, is the General Manager.

Center & Teneha.—This company has been organized at Center, Tex., largely through the efforts of R. L. Parker, of that town, to build a line from Center to Teneha, about 11 miles, to connect with the Houston, East & West Texas road. It is proposed to secure local subscriptions amounting to $18,000 to grade the line. The balance of the work will be done by E. S. Hicks, a lumberman of Teneha, and the Houston, East & West Texas Railroad.

Chicago & Northwestern.—The company proposes to build a branch, five miles long, from Havelock, a town on their line, south to Pocahontas Center, Pocahontas County, Ia.

Dakota, Wyoming & Missouri River.—During 1892 this company, of which W. T. Coad, of Rapid City, S. D., is President, built about 30 miles of the line east of Mystic to Rapid City, S. D. The work was suspended after a few miles of track had been laid and nothing has since been done. It is now claimed that influential men in Chicago have become interested in the road and that they propose to complete the line to Rapid City this year and later extend it through to Chamberlain, S. D.

Dallas Belt Line.—A charter for this company was filed in Texas last week. The incorporators are William Lhotka, A. T. Perkins, Charles MacDonald, William H. Cothren, J. M. Witherspoon, F. G. Adamson, S. L. Terrell, Charles C. Cobb, J. M. Avery, Thomas Scurg.

Duluth, Mississippi River & Northern.—Tracklaying has been begun on the 35 miles of extensions and branches projected in Northern Minnesota. The road is built primarily to carry pine logs, but its extension will connect it with several large Mesaba range mines. It hauled, chiefly for the Swan River Logging Co., this winter 75,000,000 ft. of logs. Of these 40,000,000 ft. now lie banked in the river, forming a pile of logs the width of the Mississippi, 4,900 ft. long and 25 to 28 ft. deep. This is the largest quantity of logs ever assembled in one banking ground in the history of the lumber trade.

Ebensburg & Black Lick.—Tracklaying on this 10. mile branch of the Pennsylvania to run between Ebensburg and Black Lick was commenced March 30 by Contractor Charles McFadden, of Philadelphia.

Gainesville, Rocky Point & Micanopy.—The track laying on the graded portion of this road south of Gainesville, Fla., is expected to be completed this week. This will bring the line to Rocky Point about half way between Gainesville and Micanopy. The line has been located between these points, 12 miles, and surveys have been made to Alachua Lake. The road is being completed by the company's officers, James M. Graham, of Gainesville, the Vice-President, being the chief promoter. The work done so far has been entirely with local funds, but bonds have been authorized to extend the line south of Micanopy. V. I. Herlong, of Gainesville, is the engineer.

Galveston & Great Northern.—A charter for this company was filed in Kansas last week providing for a line from the Missouri River at Niobrara, Neb., to Galveston. The directors are Edward Roemer, P. J. Doherty, Edwin S. Shafer and Frederick Emigholz, of New York; Daniel F. O'Rourke, of Altoona, Pa.; Jas. Galloway, of Hoboken, N. J.; Ansel R. Clark, A. H. Brown and P. P. Truehart, of Sterling, Kan. The President is Edward Roemer, a civil engineer, of No. 177 East 93d street, New York, who has been named as incorporator of several other companies organized in Kansas during recent years.

Hearne & Brazos Valley.—A new survey is now being made by Engineer Rumble, of Little Rock, Ark., for the proposed extension of this railroad to the town of Calvert, on the Brazos River. The line is less than 10 miles long and is to be built by the town of Calvert, but when finished will be operated by this railroad company.

Kansas City, Arkansas & New Orleans.—The tracklaying north of Stuttgart, Ark., has been recently commenced on this road, and about seven miles of the line will be completed and in operation by April 10. The line is now nearly graded between Stuttgart and Hazen, Ark., about 23 miles, and this portion of the road will probably be completed during the year. The line is projected and has been surveyed to Beebe Station on the St. Louis, Iron Mountain & Southern road. G. D. Foster is the General Manager at Stuttgart, Ark., and C. G. Stoddart is President, with office at 18 Broadway and at Stuttgart.

Lake Superior, Gulf & Southwestern.—General Manager L. N. Martin has just returned to Des Moines, Ia., after an extended tour along the proposed route in Arkansas and Missouri. He confirms the report previously printed that a contract for building about 300 miles of the railroad between Little Rock, Ark., and Springfield, Mo., has been let to the Interstate Construction Co., of New York, of which J. E. Rosenfeld, of Omaha, is the President. J. H. McCarthy, of Little Rock, has the contract under the construction company for about 100 miles of the road out of Little Rock.

Midland Terminal.—Robert Newell, Resident Engineer of this railroad, reports that the contractors at present have over 800 men on the line south of the town of Midland, Col., to the Cripple Creek mines. The grading has been completed for some miles south of Midland, and the rails are now arriving at that town. Work on the 500 ft. tunnel is being pushed on both ends. It is through granite, and on account of this no close estimate can be made as to when the railroad will be opened for traffic to the Cripple Creek mines.

Missouri, Kansas & Texas.—The opening of the St. Louis Division of this line for through passenger traffic to St. Louis was annouced on April 1. Through trains, as already annouced, leave the company's own line near Texas Junction, Mo., where it joins the new line of the Chicago, Burlington & Quincy, and cross the Missouri River on the Bellefontaine bridge of that company and run thence into St. Louis. The city terminal will be in the new Union station of the Terminal Railread Association as soon as it is opened. For the present, however, trains will use the new station at Mullanphy street and Broadway in the north end of St. Louis, which is owned by the Chicago, Burlington & Quincy.

Neversink.—Building a railroad up the Neversink from a point near South Fallsburgh, on the New York, Ontario & Western, is a proposition that has been agitated for years, but has never before taken such practical shape as at present. The route has been already surveyed, and it is rumored that Drake & Stratton will build the road. It is the intention to continue the road to a junction with the Ulster & Delaware Railroad.

New Roads.—The contract has been recently let to build a railroad to the Thurber coal mines in Palo Pinto County, Tex., about 75 miles west of Fort Worth. These coal mines have been operated for some years, and as soon as the proposed railroad is completed to the mines it is expected that the output will be largely increased. The railroad proposed will be about 45 miles long, and extend from Thurber on the Texas & Pacific, which is now the nearest railroad station to the mines, south through Erath County to a point near Dublin, the junction of the Fort Worth & Rio Grande and the Waco & Northwestern railroads.

A survey has just been completed for a new railroad from Bessemer City, on the Richmond & Danville, to Crouse's, N. C., near Shelby, on the Carolina Central. This new road will be built by a company organized by Bessemer City capitalists, and will pass through a rich mineral section.

A lumber railroad about 12 miles long is being built by a lumberman named Cumming from Manassas, Ga., a station on the Savannah & Western road, through Tatnall County for about 12 miles.

About $50,000 has been subscribed in Perry County, Mo., for a proposed railroad from Perryville, the county seat, north to the Mississippi River opposite Chester, Ill., the distance being about 10 miles.

Ottawa, Arnprior & Parry Sound.—E. F. Farquhar, of Toronto, Ont., has secured the contract to construct 35 miles of the Ottawa, Arnprior & Parry Sound Railroad from Barry's Bay to Long Lake, Ont. Barry's Bay is a small town about 30 miles west of Eganville, to which trains are now running.

Parrott Lumber Co.—This company, whose chief office is at Atlanta, Ga., is building a lumber railroad about 16 miles long in Tatnall County, in southeastern Georgia. The grading is being built by the Chattahoochee Brick Co., as contractor. The road starts from Hagans on the Savannah & Western and is now completed and in operation for about five miles from that town. The terminus of the line is to be at Glynnville and the work is now in progress toward that town.

Pecos Valley.—Mr. J. J. Hagerman, of Colorado Springs, Col., announces that the company has let the contract to extend its road from Eddy to Roswell, N. M., a distance of 75 miles, to J. H. Hampson, the work to be completed in September next. The extension will open for settlement one of the finest bodies of irrigated lands in the West, and will bring the Pecos Valley into direct communication with Denver.

Pennsylvania & West Virginia.—A reorginazation of this company is said to have been effected recently and $200,000 subscribed in Bedford County, Pa., to complete the road. The local papers which print these reports fail to give the names of any of those interested in the alleged reorganization. Carroll T. Hobart, a railroad contractor of Vermont, did some work on this line near Bedford, Pa., in 1891, but the project became bankrupt before any track was built. Considerable grading, however, was done between Bedford and Cessna, in Bedford County. It is claimed that those now interested propose to complete the line between Hollidaysburg and Cessna, Pa., and south through Bedford County to the Pennsylvania State line and into West Virginia.

Philipsburg, Ebensburg & Johnstown.—The capitalists back of this newly chartered line to extend from Ramey to Johnstown, Pa., are connected with the United Collieries Companies, which control large tracts of coal lands in Western Pennsylvania. The new road is to connect with the Altoona & Philipsburg Connecting, now under construction, at Ramey, and at Johnstown with the Baltimore & Ohio. The total length of the line will be 48 miles. Samuel L. Langdon, of Philadelphia, is President. A recent decision of the Pennsylvania Supreme Court affecting the location of the Altoona & Philipsburg Connecting road may delay the building of this line.

San Antonio & Gulf Shore.—President William Davis, of San Antonio, has failed to secure the subscription of $100,000 from the city of San Antonio in aid of his projected railroad from that place to Velasco, Tex. He states now that no further work will be done on the line near San Antonio, but that Velasco having subscribed $200,000 to the, company his efforts will be confined to starting work from that town.

St. Louis & Eastern.—A petition has been filed at Edwardsville, Ill., in the County Court, for leave to condemn land for a branch eight miles long, to be built from Marine to Alhambra, Ill. W. E. Guy, of St. Louis, is President.

Texas Midland.—The short extension to Ennis, Tex., five miles south of the previous southern terminus of the road at Garrett, Tex., has been completed, and the first trains were run into Ennis on March 25. The line was built by the Bethune & Craney Construction Co.

Texas & Pacific.—The citizens of Breaux Bridge, La., have appointed a committee to urge upon the Texas & Pacific Railroad the importance of building a proposed line from Palmetto, a station on the Texas & Pacific, via Port Barre, Leonville, Arnaudville, Breaux Bridge, Lafayette, to Abbeville, in Vermillion parish, and from there to deep water in Vermilhon Bay.

Wheeling & Elm Grove.—A surveying party under Engineer G. Browne is in the field laying out the route for a short extension of this road from Elm Grove to Triadelphia, W. Va. One of the conditions on which the road will be built is that the people along the proposed line give free right of way, and that the people of Triadelphia give the ground for a station.

White & Columbia.—W. B. Allen, of Seattle, states that a $25,000 issue of bonds has been sold by Grattan H. Wheeler, of Chicago, for the construction of this road The line is to be five miles long, extending from Buckley, Wash., up the White River Valley, and will serve, for the present at least, as a logging and coal road. C. N. Joynt, of Buckley, is President of the company.

GENERAL RAILROAD NEWS.

Atlantic & Danville.—This railroad was sold at Norfolk, Va., on April 3, under order of the United States Court, to B. Newgass and associates for $1,105,000.

Cape Fear & Yadkin Valley.—Judge Simonton, of the United States Circuit Court at Charleston, S. C., has appointed Mr. John Gill, President of the Mercantile Trust & Deposit Co., of Baltimore, temporary Receiver of the railroad. The appointment of the Receiver was made upon the application of bondholders of Baltimore and New York. The North State Construction Co., which built the road, is in the hands of a receiver, and the Receiver of the railroad was appointed so that the affairs of the two companies could be kept separate. The main line of the railroad is from Wilmington to Mt. Airy, N. C., 248 miles.

Central Pacific.—The counsel of the company in New York, in explaining the recent resignation of President Huntington and other directors, states that some of the English stockholders of the Central Pacific have urged that the Central Pacific should have an independent Board, made up of persons who were not directors of the Southern Pacific company. "While we could see no particular reason for such a change, we saw, on the other hand, no particular objection thereto, and the changes made in the directory, by the resignation of Mr. Huntington, Mr. Gage, Mr. Crocker and General Hubbard, have been made with the sole desire of meeting the suggestions of the English stockholders in reference to the matter. Such changes have nothing to do with the lease or the revision of the lease of the Central Pacific to the Southern Pacific Company."

Chicago, Burlington & Quincy.—The February report of earnings makes the following comparisons:

Month of February:	1894.	1893.	Inc. or dec.
Freight	$1,636,246	$2,099,678	D. $463,331
Passenger	502,274	585,772	D. 83,498
Miscel	289,272	296,787	D. 7,515
Total earn	$2,427,892	$2,982,236	D. $554,344
Oper. expenses	1,553,089	2,043,423	D. 490,334
Net earn	$874,803	$938,813	D. $64,010
Fixed charges	800,000	822,881	D. 22,881
Balance	$74,803	$115,932	D. $41,129
Since Jan. 1:			
Gross earn	$5,064,873	$6,034,529	D. $969,656
Oper. expenses	3,293,645	4,248,762	D. 955,117
Net earn	$1,771,228	$1,785,767	D. $14,539
Fixed charges	1,600,000	1,645,762	D. 45,762
Balance	$171,228	$140,005	I. $31,223

Cincinnati, New Orleans & Texas Pacific.—The Cincinnati, Hamilton & Dayton has secured control of what are known as the "Erlanger Roads," the Cincinnati Southern and Alabama Great Southern, by an agreement made on behalf of the company, to purchase the Cincinnati Extension bonds owned by Baron Erlanger, who is now in this country. These bonds amount to $6,000,000, a majority of them being owned by Baron Erlanger. They were issued in 1890, to secure a controlling interest in the Alabama Great Southern, and were guaranteed by the East Tennessee, Virginia & Georgia and the Richmond & Danville roads. When Drexel, Morgan & Co. undertook the reorganization of the Richmond Terminal properties, they offered the holders of the Cincinnati Extension bonds 125 per cent. in preference stock of the reorganized company. This offer was not accepted and the bondholders appointed a committee to negotiate with Drexel, Morgan & Co., and as a basis of negotiations made a counter-proposition asking for 50 per cent. of the bonds in bonds of the reorganized company, and 80 per cent. in preference stock. Drexel, Morgan & Co. declined this proposition, and in the modified plan of reorganization issued recently, the Cincinnati Extension bonds were not included. Baron Erlanger says that he then received the proposition from the Cincinnati, Hamilton & Dayton interests to purchase the bonds, which he accepted, and in the agreement he made with the representatives of that company the minority bondholders are protected. The plan proposed is that a new corporation be formed, taking the first mortgage bonds of the Cincinnati Extension bondholders and giving in return a five per cent. bond guaranteed by the Cincinnati, Hamilton & Dayton. The new corporation will have a share capital of $6,000,000 (the amount of the existing Cincinnati Extension bonds), and this corporation will issue $2,500,000 first mortgage five per cent. bonds and $3,500,000 five per cent. income bonds. The minority stockholders are opposed to the agreement made by Baron Erlanger, and a meeting at the office of Poor & Greenough, New York, this week, when over $2,000,000 of the bonds were represented for organization.

Columbus, Hocking Valley & Toledo.—The directors of the company have decided to offer to the stockholders $1,400,000 of six per cent. mortgage bonds of the Ohio Land & Railway Co., now in the treasury of the first-named company, and $1,400,000 of six per cent. car trust bonds of the railroad company at 75 per cent. The Ohio Land & Railway company bonds are part of an issue of $1,500,000 secured by a mortgage on about 11,000 acres of coal lands, and guaranteed by the Columbus, Hocking Valley & Toledo. The coal lands have been leased to the Hocking Coal & Railroad Company, which is owned by the Columbus, Hocking Valley & Toledo Railway Co. The car trust bonds are part of an issue of $1,750,000, secured by equipment costing over $2,600,000, on which the company has already paid $1,500,000.

Delaware & Hudson.—The directors of the Delaware & Hudson Canal Company have decided to issue $5,000,000 new stock for subscription by present stockholders at par. The issue will increase the total capital of the company to $35,000,000. The proceeds of the new stock is to be used for retiring $4,829,000 bonds maturing next October.

Georgia Pacific.—Judge Pardee, of the United States Circuit Court, at Atlanta, Ga., has issued an order for the foreclosure sale of this road in the suit of the Central Trust Co., of New York. This action is in accordance with the plan for the reorganization of the Richmond Terminal properties. The decree provides for the sale of the entire road between Atlanta and Birmingham and thence to the Mississippi River. The sale will take place at Atlanta on a date to be fixed by the Special Master, F. A. Angier.

Jacksonville, Tampa & Key West.—Justice Patterson, of the Supreme Court at New York, has appointed Albert Stickney referee to try the issues involved in the action pending in that court brought by Robert H. Coleman, the former president of the company, against James H. Young and Mason Young.

Kansas City, Memphis & Birmingham.—The reorganization plan which was issued in November, 1893, has been accepted by more than 90 per cent. of the bondholders of the company, and the trustees, Messrs. Higginson, Bartlett and Merriam, announce that the time for receiving bonds under the plan will not be extended beyond April 10.

New Albany Belt & Terminal.—Judge Baker, of the United States Court at Indianapolis yesterday appointed John McLeod, of Louisville; F. M. Tracy, of Springfield, Ill., and S. M. Felton, of Cincinnati, Receivers for this company. It owns about three miles of belt line at New Albany, which recently has been operated by the Kentucky & Indiana Bridge Co.

Newport News & Mississippi Valley Co.—The appointment of Edmund Zacher, of New Haven, Conn., as temporary Receiver of this company was made permanent by an order issued by Judge Wheeler in the Connecticut Superior Court last week. The appointment of Mr. Zacher is made in the proceedings brought by the officers of the company to dissolve the corporation, as already explained.

New York, Lake Erie & Western.—Drexel, Morgan & Co. announce that they have received on deposit under the reorganization plan $26,569,000 Erie second consols out of a total issue of $33,597,400; $3,110,000 Erie funded coupons out of an issue of $4,031,400, and $432,832 Erie incomes out of an issue of $508,008. They state that they are still of the opinion that the company can more than meet its fixed charges as now adjusted, and the holders of the new bonds will have a security on which they can depend. If, contrary to expectations, there should be any default in interest, the bonds have the benefit of a mortgage under which a foreclosure can be promptly secured, thus obviating the difficulties existing under the present consolidated mortgage. E. H. Harriman, Chairman of the Protective Committee of Holders of Erie seconds, who are opposed to the reorganization plan, says that this circular will not affect the policy of the committee, and that it proposes to test the legality of the position taken by the Reorganization Committee.

The new consolidated mortgage of the company for $70,000,000 provided for in the new reorganization scheme referred to above was filed for record this week. The new mortgage is to retire the old second mortgage bonds and to take up the floating debt. The Farmers' Loan & Trust Co., of New York, is trustee of the bonds.

The earnings for February, including all leased and operated lines, are reported as follows:

	1893.	1894.	Dec.
Gross earn	$2,100,482	$1,547,357	$553,125
Oper. exp	1,460,841	1,251,138	209,703
Balance	$639 641	$296,219	$343,422
Rentals	179,456	140,939	38 517
Net earn	$460,185	$155,280	$304,905
October to February:			
Gross earn	$12,176,216	$10,601,747	$1,574,469
Oper. expen	8,256,902	7,633,188	623,714
Balance	$3,919,314	$2,968,559	$950,755
Rentals	1,099,095	969,852	129,243
Net earn	$2,820,219	$1,998,707	$821,512

Norfolk & Western.—The annual report just issued, for the year to Dec. 31, shows the following results of the year's operations:

	1893.	1892.	Inc. or dec.
Gross earnings	$10,032,610	$9,952,881	I. $79,729
Oper. expenses	7,199,453	7,031,673	I. 167,780
Net earn	$2,833,157	$2,921,208	D. $88,051
Other income	141,190	280 866	D. 139,676
Total	$2,974,347	$3,202.074	D. $227,727
Fixed charges	3,074,089	3,505,762	D. 431,673
Deficit	$99.742	$303,688	D. $203,946

The mileage operated was 1,556, an increase of 248 miles. The gross earnings of the 193 miles of the Ohio Extension were $457,041, showing that the gross earnings of the older portions of the line decreased $377,305. The total number of passengers carried in 1893 was 2,052,387, a decrease of 180,522, and the number of tons of freight moved was 6,325,735 tons, a decrease of 298,992 tons. For the first time since the organization of the company there was a decrease in the mineral traffic. The total mineral traffic for 1893 was 4,599,914 tons, a decrease of

205,747 tons as compared with 1892. The shipments of iron ores were 485,851 tons, a decrease of 132,906 tons. The shipments of pig iron were 298,257 tons, a decrease of 119,354 tons. The quantity of coal and coke transported (including 555,114 tons used by the company) was 3,963,877 tons, an increase of 297,144 tons.

Northern Pacific.—The receivers of the company will ask the United States Circuit Court to authorize the extension of the $1,960,000 of receivers' certificates which mature on April 1. The application may also be made to include that portion of the $5,000,000 originally authorized and which have not been issued.

Owensboro, Falls of Rough & Green River.—The United States Trust Co., of New York, filed a suit in the Federal Circuit Court at Louisville, Ky., on March 27, asking that the railroads be placed in the hands of a receiver, and that the mortgage be foreclosed. The road is about 41 miles long, from Owensboro, Ky., to Horse Branch, and for a time was operated by the Newport News & Mississippi Valley Co. M. V. Monarch, of Owensboro, President of the railroad, was appointed Receiver.

Pennsylvania.—The statement of the business of all lines of the Pennsylvania Railroad east of Pittsburgh and Erie for February, 1891, as compared with the same month in 1893, shows a decrease in gross earnings of $1,124,717; a decrease in expenses of $1,014,077; a decrease in net earnings of $110,639. The two months of 1894, as compared with the same period of 1893, show a decrease in gross earnings of $1,888,134; a decrease in expenses of $1,891,694; an increase in net earnings of $3,560. All lines west of Pittsburgh and Erie for February, 1894, as compared with the same month in 1893, show a decrease in gross earnings of $543,287; a decrease in expenses of $479,592; a decrease in net earnings of $63,694. The two months of 1894, as compared with the same period of 1893, show a decrease in gross earnings of $939,798; a decrease in expenses of $895,049; a decrease in net earnings of $74,748.

Philadelphia & Reading.—The earnings and expenses of the railroad for the month of February and the fiscal year, as compared with the same period last year, are as follows:

	1894.	1893.	Inc. or dec.
Gross earn	$1,279,617	$1,631,347	D. $351,730
Gross expen	805 944	1,203,455	D. 397,511
Profit in operating	$473,673	$427,892	I. $45,781
Other receipts	14,162	18,056	D. 3,893
Profit for month	$487,836	$445,947	I. $41,888
Equipment payment	116,657	332,819	D. 216,161
Terminal trackage	50,000	.....	I. 50,000
Improvement at Broad Street and Lehigh avenue	50,709	6,942	I. 43,766
One-twelfth of fixed charges (est.)	720,000	718,678	I. 1,321
Total charges	$937,366	$1,058,440	D. $121,073
Deficit	$449,530	$612,492	D. $162,962
Year to Feb 28:			
Gross receipts	$4,426,424	$5,105,494	D. $679 070
Gross expenses	2,667,676	3,499,081	D. 831,385
Profit in operating	$1,758,748	$1,606,433	I. $152,315
Other receipts	162,023	109,144	I. 5 ,879
Profit for month	$1,920,770	$1,715,577	I. $205 195
Equipment payments	346.017	617,077	D. 271,059
Terminal trackage	150,000	.....	I. 150,000
Improvement at Broad St. and Lehigh Ave	101,476	6,942	I. 94,533
Fixed charges (est.)	2,160,000	2,156,036	I. 3,963
Total charges	$2,757,493	$2,780,056	D. $22,562
Deficit	$836,721	$1,064,479	D. $227,757

Savannah & Western.—The petition of the minority bondholders represented by the committee, headed by Simon Borg, of New York, for the removal of Mr. H. M. Comer, the Receiver of the Central of Georgia, as the Receiver of this property, was argued before Judge Pardee in the United States Court at Savannah, Ga., on March 26. Judge Pardee has not announced his decision, although he intimated that as the petition represented less than one-fourth of the bondholders and the Central Trust Co., trustee of the mortgage, declined to join in the request for the removal of Mr. Comer or take any part in the proceedings, it was unlikely that he would grant the order requested.

St. Louis, Cape Girardeau & Fort Smith.—The contest over the Receivership of this road which has been going on since March, 1893, when Messrs. Eli Klotz, of Piedmont, Mo., and President Louis Houck, of Cape Girardeau, Mo., representing conflicting interests in the property, were appointed Receivers, has been decided in favor of Receiver Klotz by the State Supreme Court. Mr. Klotz was appointed Receiver by the County Circuit Court on March 3, 1893. On the following day President Houck learning of this action secured an appointment from the court in Cape Girardeau County as Receiver of the railroad and assumed control of the property, denying Mr. Klotz's claim for possession. President Houck has asserted that he was representing the interests of the stockholders and that Mr. Klotz represented the Missouri Pacific. The road is about 100 miles long, extending from Cape Girardeau through southeastern Missouri to Hunter.

Toledo, Ann Arbor & North Michigan.—Opposition has developed on the part of certain interests of the stockholders to the proposed reorganization plan of the Bondholders' Committee briefly outlines in a previous issue. A committee, of which James A. Blair, of New York, is Chairman, has been formed which claims to represent a majority of the outstanding stock and is preparing a new reorganization scheme.

Union Pacific.—Below is given the earnings and expenses of the Union Pacific system proper, and of the entire system, which includes all the leased lines:

UNION PACIFIC (PROPER).			
Month of January:	1894.	1893.	Dec.
Gross earn	$1,030,358	$1,404,791	$374,433
Oper expen	726,428	888,883	162,455
Net earn	$303,930	$515,908	$211,978
UNION PACIFIC SYSTEM.			
Gross earn	$2,272,641	$3,161,993	$889,351
Oper expen	1,735,409	2,205,332	469,923
Net earn	$537,232	$956,660	$419,428

Union Pacific, Denver & Gulf.—Judges Sanborn and Caldwell, sitting at Omaha on March 29, decided in the controversy between the Union Pacific and the Union Pacific, Denver & Gulf roads that the Union Pacific Receivers were not bound by the contract made by the Union Pacific company with the Gulf road and should not be held to it. They rescind the orders of Judge Hallett, of Denver, who enjoined the Union Pacific from abandoning the Julesburg line to Denver, and who directed the Union Pacific to pay interest on Gulf bonds. William H. Cornish, of St. Paul, is appointed Special Master in Chancery in the case. The Circuit Court in Nebraska is declared the court of jurisdiction for the Union Pacific, and that in Colorado for the Gulf system.

TRAFFIC.

Traffic Notes.

The Delaware & Hudson Canal was opened on April 2.

The Executive Committee of the Trunk Line Association has voted that whenever there is a blockade on any road, making it necessary to refuse freight, the Freight Traffic Department of that road shall give notice to all connecting lines.

Trunk Line Commissioner James F. Goddard has ordered the differential of the Erie road on westbound freight reduced to the basis in effect previous to Jan. 1, when he increased it in order to give that road a larger share of the competitive traffic. That change placed the rates on the basis of 65 cents, first class, New York to Chicago, and they are now restored to the 70-cent basis.

The Lehigh Valley, the Grand Trunk and the Chicago & Grand Trunk have put on a through vestibule passenger train to run each way daily between New York and Chicago, making connections also to and from Philadelphia. The trains will have dining cars conducted on the European plan. The time through is 28 hours, and the westbound train leaves New York at 6:10 p. m.

The Delaware, Lackawanna & Western has followed the Lehigh Valley in reducing the rate on anthracite coal from the mines to New York harbor, but has made a fixed rate instead of one based on the value of the coal. The new tariff went into effect on April 2 and the rate is $1.45 on all sizes, a reduction of 30 cents a ton. It is reported that the Pennsylvania will make its rate 40 per cent. of the selling price, or about $1.51 on prepared sizes. The Lehigh Valley rate is 40 per cent. on all sizes.

The suit of the New York & New England against the New York, New Haven & Hartford to compel the latter road to receive freight at junction points without demanding prepayment is still unsettled, the hearings before the different United States judges being adjourned for one cause or another. The preliminary injunctions granted seem to indicate that the New Haven road has been exceeding its legal powers by refusing to advance freight charges on one shipment because the New England road owed it money on another shipment. At a hearing in Boston on Monday prominent officers on both roads were present, and it would appear, as stated by one of the lawyers, that the dispute is made the basis of a general contest between the roads, some of the speechmaking being addressed to "the galleries."

The express companies do not take kindly to state regulation in Missouri. The Railroad Commissioners adopted an order reducing the rate on general "specials" (a class that includes farm products, fruit, etc.) 10 per cent., and directed the companies to file an amended schedule in accordance therewith, but the order was ignored and its receipt was not even acknowledged. The Commissioners then referred the matter to the Attorney-General, and that official, after examining the law, now says that there is no provision requiring the companies to file amended schedules. He says, however, that if the rates established by the Commissioners are violated, he will then have ground to prosecute. The last General Assembly appropriated $4,000 to be used by the Commissioners in investigating overcharges of express and freight rates.

Chicago Traffic Matters.

CHICAGO, April 4, 1894.

It is too soon to determine whether the Eastern roads are keeping the agreement to restore freight and passenger rates April 2, but Central Traffic Association officials are sanguine that all the roads will act in good faith both as regards freight and prssenger rates. A rumor was current here last week that the Lehigh Valley had stocked the market with tickets, which allow a cut in the through rate to New York, but the report is not confirmed.

The outlook for a reasonable maintenance of lake and rail rates this season is promising, based largely upon the assumption that the lake lines cannot themselves afford to cut the rates, and the improbability that any of their rail connections will be a party to reductions on account of the determined position taken by the Western lines last season. Rates on grain and grain products have been agreed to on the basis of 15 cents per 100 lbs. from Chicago to New York, and 17½ cents from Duluth to New York. Class rates from Chicago will be:

1	2	3	4	5	6
60	52	40	30	25	20

From Duluth rates will be:

1	2	3	4	5	6
75	60	50	35	30	25

Northwestern lines have agreed to maintain the same rates from Minneapolis via Milwaukee or Chicago as made via Duluth. On grain this is 25 cents per 100, made up of the rail rate of 7½ cents Minneapolis to Duluth, and 17½ cents Duluth to New York, divided 40 per cent. to the northwestern lines when billed to Milwaukee or Chicago, and 60 per cent. East.

Chicago shippers are hopeful that the securing of southern connections by the Cincinnati, Hamilton & Dayton will ultimately greatly benefit Chicago by furnishing an outlet via the Monon and the Cincinnati, Hamilton & Dayton and allied southern lines. Chicago has for a long time complained at the refusal of the Southern Railway & Steamship Association to join in any tariffs via Cincinnati which would allow Chicago merchants to compete with New York in this territory. Last November a complaint was filed with the Interstate Commerce Commission by the Chicago Freight Bureau praying for an equitable readjustment of tariffs and alleging that rates from Chicago to this territory were excessive and exorbitant, in that they were greatly higher than from New York to the same territory, the distance being less from Chicago than New York; also arguing that inasmuch as the New York basis obtains from Boston to these points, the Cincinnati basis should obtain from Chicago, the distance from Boston to New York being substantially the same as from Chicago to Cincinnati.

Some comment was caused last week by the issuance by the Northwestern Dispatch line of a tariff on grain and grain products from Kewaunee, Mich., to New York on a basis of 18 cents per 100 lbs. in connection with the Toledo, Ann Arbor & North Michigan. This was taken as an indication that the Ann Arbor line was determined to again attempt to force the recognition of a differential for its ferry transfer. It gave rise also to a suspicion that the Lackawanna, or some other Eastern connection in trunk line territory, was not acting in good faith. The Chicago lines claim that the Northwestern Despatch will be unable to find any connection that will protect the 18-cent rate. It is known that the Grand Trunk has declined to accept billing at less than 20 cents. This ferry line was a troublesome factor in the situation last year and is likely to prove equally troublesome this season. It will be remembered that the northwestern lines complained bitterly of its action and finally made an arrangement with the Chicago & Grand Trunk to meet, via Chicago, any rates made via Kewaunee. After negotiations had been carried on for some time the Toledo, Ann Arbor & North Michigan restored rates via the Kewaunee route.

The Chicago & Northwestern has remitted freight and passenger charges amounting to about $5,000 on account of destitution in the iron ore district.

The Alton having determined to meet the competition of the St. Louis, Keokuk & Northwestern by selling round trip land-seekers' excursion tickets at half fare April 24 and May 29 from Louisiana, Mo., to all points on the Kansas City, Ft. Scott & Memphis, other lines have been given authority to make the same rates.

The Western Freight Association has elected Thos. Miller, J. M. Johnson and C. A. Parker a committee to represent the association at the adjourned conference with the Interstate Commerce Commission respecting joint tariffs.

The rate on whisky, Louisville to Chicago, will be advanced from 17 to 22 cents per 100 lbs. in car lots, and from 22 to 36 cents per 100 lbs., L. C. L., effective April 10.

The local association of the Western Passenger Association recently purchased from a broker six tickets reading over the Chicago, Burlington & Northern from Chicago to St. Paul, at a reduction from tariff of a dollar or more each, and on the strength of the purchases fined the Burlington $350. The Burlington denies that it received less than tariff rate for the tickets, and has appealed to arbitration.

Lake navigation opened April 1 with the departure of 18 vessels with grain for Buffalo. Some apprehension is expressed as to the vessels having a safe passage through the straits, dispatches from Mackinac and Cheboygan stating that the straits are full of ice. One vessel, in fact, was sunk at the straits on Monday.

Eastbound shipments last week were again largely increased on account of the contemplated restoration of rates this week.

The shipments of eastbound freight, not including live stock, from Chicago, by all the lines, for the week ending March 31 amounted to 95,188 tons, against 85,316 tons during the preceding week, an increase of 9,872 tons, and against 82,522 tons for the corresponding week last year. The proportions carried by each road were:

Roads.	W'k to Mar. 31.		W'k to Mar. 24	
	Tons.	P. c.	Tons.	P. c.
Michigan Central	9,286	9.7	10,985	12.9
Wabash	8,946	9.4	8,404	9.8
Lake Shore & Michigan South.	15,631	16.4	14,063	16.5
Pitts., Ft. Wayne & Chicago	15,696	16.5	12,660	14.9
Pitts., Cin., Chicago & St. Louis	9,106	9.6	8,110	9.5
Baltimore & Ohio	8,690	9.1	6,892	8.1
Chicago & Grand Trunk	6,267	6.6	7,213	8.5
New York, Chic. & St. Louis	9,004	9.5	8,163	9.5
Chicago & Erie	10,098	10.6	6,388	7.5
C., C., C. & St. Louis	2,464	2.6	2,438	2.8
Totals	95,188	100.0	85,316	100.0

Of the above shipments 16,519 tons were flour, 49,172 tons grain and millstuff, 8,577 tons cured meats, 11,014 tons dressed beef, 1,131 tons butter, 1,175 tons hides and 5,655 tons lumber. The three Vanderbilt lines carried 35.6 per cent., the two Pennsylvania lines 26.1 per cent.

(Other Chicago traffic news will be found on page 247).

Lake Superior Freight Traffic.

Lake freight rates from Duluth to Lake Erie open at the lowest figures on record. A season contract for lumber between Duluth and Tonawanda was made at $1.75 per 1,000 ft. About 1,500,000 bushels wheat is contracted from Duluth at 2½ cents and lower, and nearly 2,000,000 gross tons of ore are to go down from the head of Lake Superior for 80 cents. Coal freights up are dull at 25 cents a ton. Of the 11,000,000 bushels of wheat at the head of Lake Superior the local mills are expecting to grind 10,000,000 bushels before October. This is not at all pleasing to owners of vessels built to carry only bulk cargoes. About 500,000 tons of coal, or 22 per cent. of last year's receipts, are still on docks at the head of Lake Superior, and this will largely reduce the coal traffic. Lumber sales from the region have been small.

The Trans-Continental Passenger Situation.

The agreement, briefly noted in this column last week, for a restoration of all rates west of the Mississippi River was brought about at a conference between representatives of the Atchison and Northwestern. The Atchison persisted in its determination not to agree to a restoration of the Chicago-Missouri River rates until it was assured that the Union Pacific would maintain rates west of the Missouri. The Northwestern was equally anxious for a restoration, and also to clear its skirts of what it claimed was an unwarranted charge of collusion with the Union Pacific, and the result was that an agreement was soon reached with the Union Pacific—just how is now stated. Coupled with the agreement for the restoration of rates was an agreement that on and after April 1 all irregular commissions should be abolished, and commissions restored to the authorized basis of Feb. 28.

Negotiations between the Atchison and Southern Pacific respecting the matters of difference will now be resumed at the point where they were broken off last fall and it is expected that a satisfactory understanding will be arrived at before May 15, the date to which the restored rates are effective.

On March 30 a conference was begun between representatives of the Atchison and Union Pacific and the Advisory Committee of the immigrant clearing-house of the Western Passenger Association. The Atchison agreed to resume membership whenever all the lines west from Chicago, St. Louis and the Missouri River should accept the percentages as fixed by the committee. The representative of the Union Pacific protested that his line was entitled to a larger percentage than the other trans-Missouri lines, but an agreement will probably be reached, and the assent of the Union Pacific assures the stability of the arrangement, the Canadian Pacific having already agreed to respect it.